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Paper TRADE JOURNAL

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VOLUME 126, No. 7 FEBRUARY 12, 194

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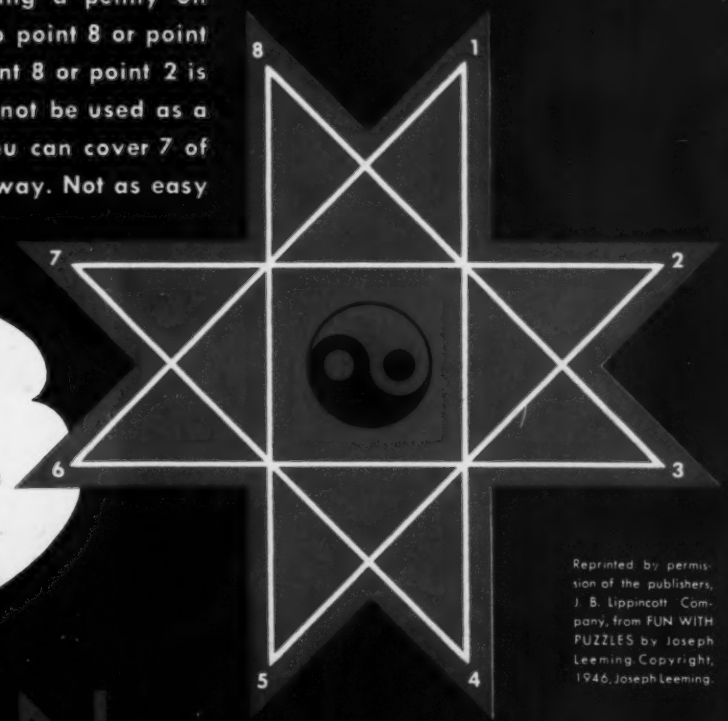
Use seven pennies or paper clips or anything else. Place pennies on 7 points of the star by starting each penny from a point not already covered by a penny and moving it along one of the straight lines to a point opposite. For example, you can start by putting a penny on point 5 and sliding it to point 8 or point 2 where it remains. Point 8 or point 2 is then covered and may not be used as a starting point. See if you can cover 7 of the star's points in this way. Not as easy as it sounds.



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And if dryer felt problems
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W. L. COOK, *Editor*
E. P. McGINN, *Technical Development Editor*

E. P. NUTTALL, *Assistant Editor*
R. G. MACDONALD, *"TAPPI" Editor*
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CALENDAR OF COMING EVENTS

February 22-27—American Paper & Pulp Association, Annual Convention. The Waldorf Astoria, New York. N. Y.

February 23-26, 1948—Technical Association of the Pulp and Paper Industry, Annual Meeting, Hotel Commodore, New York City.

May 18-20, 1948—American Pulp and Paper Mill Superintendents Association, Annual Meeting, Roosevelt Hotel, New Orleans, La.

June 11-12, 1948—Paper & Twine Association, Annual Convention, French Lick Springs, Indiana.

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In this 100th anniversary year as Machine Builders for the Paper Industry, Puseyjones points with pride to outstanding post-war installations. In the spotlight . . . 236" Kraft Machine built for: Union Bag & Paper Corporation, Savannah, Georgia.

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(NEWS ITEM: A *new parchment paper is replacing cloth for home steam pressing jobs.*)

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Paper TRADE JOURNAL

VOL. 126, NO. 7 REG. U.S. PAT. OFF. FEBRUARY 12, 1948

TAPPI Awards Medal To Dr. Emil Heuser

NEW YORK—The 1948 medal of the Technical Association of the Pulp and Paper Industry has been awarded to Dr. Emil Heuser (retired), formerly professor at the Institute of Paper Chemistry, Appleton, Wis. This award, regarded as the most important in the industry, is given each year to an individual who is considered to have made an outstanding contribution to the technical advancement of the pulp and paper industry.

Emil Heuser was born at Stralsund, Germany, September 15, 1882 and attended the Technical Universities of Munich and Karlsruhe. Following graduation he started his work in the paper industry in the rag paper mill of Gebruder Laiblin in Pfullingen, Wurtemburg. Following this he became a chemist for the Pulp and Paper Company of Altdamm in Pomerania, one of the oldest sulphate mills. From there he moved to the Zehlendorf Paper Mills near Berlin, producers of photographic papers where he took charge of the coating processes. At his next mill, the Pulp and Paper Company of Steyrermuhl in Austria he carried on the same work.

While with these companies Dr. Heuser had published various articles dealing with his work and he had become interested in the Technical Association of the German Pulp and Paper Chemists and Engineers. Because of these activities he was selected to be the successor to Carl G. Schwalbe for the chair of chemistry of cellulose and related substances at the Technical University of Darmstadt in 1912.

Dr. Heuser's activities at Darmstadt resulted in numerous publications pertaining to cellulose, lignin, noncellulose carbohydrates, chemistry of wood, etc. During the first world war he erected a plant in Monheim on the Rhine to make fodder cellulose and alcohol. It was here that probably the first successful attempt to produce furfural on a commercial scale was made.

In 1921 his textbook on Cellulose Chemistry appeared. In 1929 he founded "Celluloschemie" a periodical magazine. In 1923 he became chief editor of the volumes entitled "Technik und Proxis der Papier" fabrikation. From 1920 to 1926 he was also editor of the technical section of Der Papierfabrickant and from 1918 to 1926 was Secretary of German Technical Asso.

(Continued on page 31)

Capehart Cites Problems in Alaskan Pulp Development

WASHINGTON—Realization of larger newsprint supplies for domestic consumption as a result of development of pulp wood resources in the Alaskan forests now being offered for private development will depend on ability of the Government to channel pulp production into newsprint, a special subcommittee of the Senate Small Business Committee reported last week. Reporting upon a personal survey of Alaskan pulp and timber resources made by Chairman Homer E. Capehart and Senators Cain (Washington), and Ellender (Louisiana), the subcommittee said:

"There is no guarantee that the development of an Alaskan woodpulp industry will result in increased newsprint output, under contracts which are now being negotiated.

"Leases for timber and cutting rights in the Tongass Forest area do not require that newsprint be manufactured from the wood pulp in preference to other types of paper production."

The report suggests that the Forest Service or other government agency should be given authority to specify the production of a particular end product from national forest timber.

Pointing out that Canada at present supplies approximately 83 percent of domestic United States newsprint requirements, the subcommittee said chances of developing vast potential sources of woodpulp in Alaska are dependent upon transportation, power, labor, housing and other factors.

In view of the subcommittee view on newsprint possibilities, the report recommended that small and medium sized newspapers should give serious consideration to forming cooperative enterprises, "perhaps even to the extent of financing of a newsprint mill, or mills, in Alaska."

Possible disturbance of the salmon spawn in the various salmon streams by the logging operations was also brought up and officials of both the Fish and Wildlife Service of the Department of the Interior, and the Forest Service of the Department of Agriculture stated plans had been worked out to avoid such disturbances.

The subcommittee feels that a care-

(Continued on page 18)

Woodpulp Output Set New Record in 1947

WASHINGTON, D. C.—Production of woodpulp set a new all-time record of 11,951,548 tons in 1947, according to the Bureau of the Census, Department of Commerce. The 1947 record is 1,345,021 tons over 1946 and 1,168,118 tons above the previous high set in 1942.

The increase over 1946 was shared by 11 grades, the largest being those for the sulphate grades (14.7 percent) and the sulphite grades (13.0 percent).

Use of wood pulp in the manufacture of paper and board also reached a new high during the year as the industry reported a total consumption of 13,325,974 tons, with the sulphite and sulphate grades again showing the largest gains.

The consumption of fibrous materials other than wood pulp in the production of paper and board, at 9,323,637 tons, also reached a new high. This figure was 663,279 tons above the corresponding figure for 1946. The use of waste paper, with an increase of 566,871 tons, accounted for the bulk of this gain.

DR. EMIL HEUSER
TAPPI Honors Him

Brown Co. Advances Soderston and Herr

BERLIN, N. H.—Herbert R. Soderston, resident woods manager of Brown Company and chief logging engineer for the company and its Canadian subsidiary, Brown Corporation, has been promoted to the newly created post of general manager of woods operations for the company and corporation. C. S. Herr, who has been serving as assistant resident woods manager, has been promoted to be resident manager of woods operations for the pulp and paper company.

Mr. Soderston joined the company in 1943 as chief logging engineer. Previously he had served for about 20 years as logging engineer with the Abitibi Power and Paper Company, Ltd., in Canada. In 1942 he entered the U. S. Army, in which he served as a colonel in the capacity of director of operations on the Alaska Highway project. Mr. Soderston is a Yale University graduate.

Mr. Herr came with the company as chief forester in 1943, following 15 years with the New Hampshire Extension Service. During the war he was with the Office of Price Administration's Pulp and Paper Division in Washington. Mr. Herr is a Pennsylvania State College graduate and holds a master's degree from Harvard.

Stocker Elects Shorter To Board of Directors

NETCONG, N. J.—At the last general meeting of the board of directors of Stocker Manufacturing Company, Walter C. Shorter, was elected to serve on the board. Stocker, which is an associate company of Camp Manufacturing Company, in Franklin, Virginia, converts a considerable quantity of the paper produced in Franklin.

Walter C. Shorter, as a vice-president of the Camp Manufacturing Company and a director of Stocker Manufacturing Company, will now be in a position to consolidate the efforts of both companies in the direction of servicing all accounts on both paper and converted products of the affiliated companies.

Robertson Box Names Compton as Superintendent

MONTVILLE, Conn. — Douglas M. Compton, former board mill superintendent at National Folding Box Company, has been appointed superintendent of the Robertson Paper Box Company's board mill at this point. Mr. Compton succeeds Ollie W. Messner who resigned to accept a similar post with the Lowe Paper Company at Ridgefield, N. J.

Compton was graduated from Philips Exter Academy in 1928 and from Yale University in 1932. Since that time he has been associated with the National Folding Box Company at New Haven, where he was superintendent of the paper board mill during the past two years.

Cunningham Is Named To Chicago Committee

CHICAGO—James Cunningham, president of the Container Corporation of America, has been appointed a member of a Chicago committee of business and civic leaders to study ways and means of solving Chicago's financial dilemma. The appointment came from Mayor Martin Kennelly, and the committee is charged with drawing up recommendations for a Legislative Committee on Tax Reform which is holding hearings on these subjects.

Mr. Cunningham has long been a student of taxation in this area and his talents will be especially helpful now inasmuch as Chicago is in a determined effort to get some tax relief from the State of Illinois, a diversion of the sales tax strongly opposed by the Administration and others who are fearful that such a diversion would eventually bring about a material increase in the present 2 percent sales tax rate.

Ziegler Leaves Crescent For Econ-O-Seal

INDIANAPOLIS — Robert H. Ziegler who for the past five years has been general manager of the Crescent Paper Company Food Packaging Division has severed his connection with this organization and will devote his entire time to the manufacture and sale of Econ-O-Seal closures.

William L. Howell who has been Mr. Ziegler's assistant for the past four years becomes the new manager of the Food Packaging Division. Prior to his connection with this company Mr. Howell was associated with the McFarland Paper Company, Keokuk, Iowa.

The Econ-O-Seal Company was a division of the Crescent Paper Company, and now has become a division of the Basca Manufacturing Company, manufacturers of the equipment and Econ-O-Seal aluminum closures. The Econ-O-Seal Company's new address is 2222 North Olney Street, Indianapolis.

R. J. Knowles Joins Wandel Industries

HONEY BROOK, Pa. — R. J. Knowles, former manager of the Cheboygan mill of the Paper Corporation, is now associated with Kurt Wandel Industries, Inc., with headquarters in Honey Brook. Mr. Knowles' wide experience and acquaintance in the paper industry will be used to further the introduction of the dynopulper as well as the new dynofiner. A considerably extended business is expected for 1948.

Marinette Staff Honors Wilkinson

MARINETTE, Wis. — The Employes Mutual Benefit Association of the Marinette Paper Company honored D. B. Wilkinson, vice-president and general plant manager, Wednesday evening, February 4, upon the occasion of his 25 years of service with Scott Paper Company, parent organization of Marinette Paper. Lawrence Camps, association president, presented Wilkinson with an engraved sterling silver cigarette lighter, a gift from the members of the association, all of whom are employes of the paper company.

Wilkinson joined the Scott organization on February 5, 1923, as a salesman in Philadelphia and served in sales managerial posts there, at Chicago and at Pittsburgh. He was appointed personnel director of the company in 1938 and occupied that position until he came to Marinette as general plant manager in September 1943.

He is a graduate of the University of Michigan, a member of Rotary, a director of the Stephenson National Bank and a director of the Wisconsin district of the American Cancer Society.

G. L. Nicolson Retires as D. C. Paper Mills President

WASHINGTON, D. C.—At the organization meeting of the board of directors of the District of Columbia Paper Mills, Inc., held on January 30th, G. L. Nicolson, who has been president of the company since its formation in 1900, retired and was appointed chairman of the board of directors. His son, L. D. Nicolson, was appointed president in his place. L. D. Nicolson has been with the company since 1919 and has been serving as vice-president and general manager for the past several years.

H. T. Nicolson was reappointed as vice-president in charge of production, and was also made secretary and treasurer.

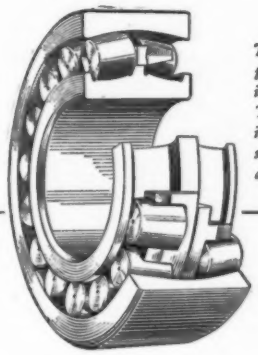
W. W. Langtry was reappointed as vice-president in charge of sales.

Backus Leaves Collins To Join Whiting Staff

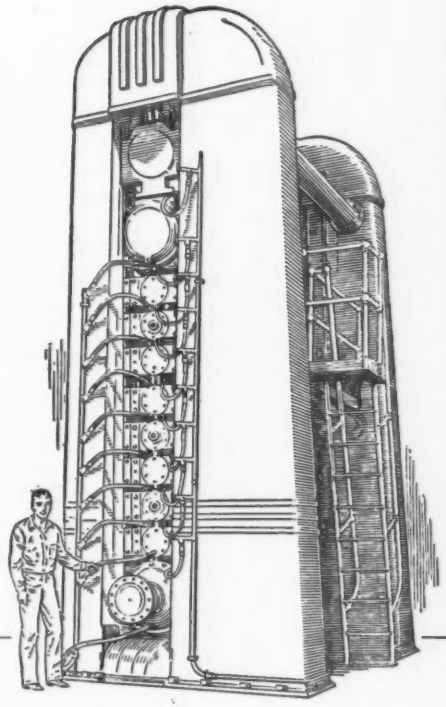
NORTH WILBRAHAM, Mass.—Charles J. Backus, who has been associated with Collins Manufacturing Company for 18 years as chemist and superintendent, has resigned to become technical director for Whiting and Company, of Holyoke. Mr. Backus is a member of the Technical Association of the Paper and Pulp Industry.

At a farewell party tendered by the company, he was presented a purse and an engraved fountain pen from the employees, and a wrist watch from Paul C. Bast, president and treasurer of the company.

You get better caliper and finish with Torrington Spherical Roller Bearings



The Appleton Supercalender Stack, made by Appleton Machine Company, Appleton, Wisconsin, is one of the first to incorporate the advantages of Torrington Self-Aligning Spherical Roller Bearings on intermediate rolls. Specially designed straight and tapered roller Torrington Bearings are used on top and bottom rolls.



...one of the many advantages for Paper Industry is the self-aligning precision design of this Torrington Bearing.

BETTER caliper and finish are only two of the advantages gained by eliminating roll crowding and maintaining constant roll alignment on supercalenders equipped with Torrington Self-Aligning Spherical Roller Bearings. The low coefficient of friction and closely held precision tolerances assure smooth starting and dependable operation, help cut losses from snap-offs and decrease power requirements. Rapid roll changes are possible because no alignment adjustments are necessary. High radial capacity and two-directional thrust capacity result in long service life.

These are typical of the many advantages you can get on your beaters, chippers, Jordan engines, screens, paper dryers and calenders by ordering Torrington Spherical Roller Bearings on new equipment, for rebuilding or replacement needs.

With many years of experience in designing and building all major types of anti-friction bearings, Torrington engineers will welcome the opportunity to assist you on any bearing requirement. Call or write the nearest Torrington office.

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New England Hails Truck Strike's End

BOSTON, Mass. — Paper manufacturers throughout New England were looking forward to early relief—possibly in a matter of days—from the crippling effects of the month-old strike of Boston truck drivers. For both sides in the dispute have expressed confidence that the trucks will be rolling shortly, following the reaching of an agreement to end the walkout.

Employee and management representatives announce that they have reached agreement on all issues, including a 23-cent-an-hour wage increase. President James V. Hurst of Local 25, AFL Teamsters' Union, said the agreement would have to be ratified shortly by the 3,500 truck drivers still on strike.

It was predicted that the drivers would vote ratification in a matter of days and that the trucks would be moving immediately after such action. Hurst and other members of the special committee refused to discuss terms of the agreement, saying they wanted the men to vote without being pressured by forehand knowledge. The employers group—motor freight carriers—also must ratify the agreement.

It was reported, however, that other benefits would increase wages of drivers beyond the 23 cents an hour. Other points of the agreement were reported to include the question of having one man or two on some trucks, special compensation for drivers on long out-of-town hauls, a premium of five cents an hour for Saturday work, and an extra holiday with pay.

The drivers had sought $65 for a 40-hour week. Before the strike they had been receiving $55.15 for 48 hours.

Green Mountain Interests Investigate Packaging

WESTMINSTER, Vt.—Mountain Packaging Materials, Inc., has filed articles of association with the secretary of state to engage in the manufacture and sale of paper products. Authorized capitalization is 100 shares of no par value common stock. The incorporators are Frederick W. Vogel and Maude M. Vogel of Bellows Falls, and Paul Brown of New York City.

Vogel, owner of the Green Mountain Tissue Company, said that the new company is establishing a pilot plant in the Green Mountain building to investigate and study a new process for making packaging materials. The product is a new type of corrugated sheet for packing boxes, he said.

The process will utilize the present equipment of Green Mountain's plant plus some new equipment. One process is now in its initial stages, Vogel said, but if it proves successful a new plant will be needed. Brown was formerly manager of the Brown Company, producers of pulp and paper in Berlin, N. H.

Eaton Names Bourne to Head Public Relations

PITTSFIELD, Mass.—The appointment of Severin Bourne as public relations director of the Eaton Paper Corporation has been made known by George P. Clayson, president of the firm. Mr. Bourne, a former owner of Nascon Products, Inc., which is now a division of Eaton, will have offices in New York at 60 East 42nd Street.

Mr. Bourne's activities in the public relations field will include news bureau and magazine contacts. He will be under the general direction of Miss Margaret Falconer, advertising and promotion manager of Eaton's.

Brown Company's Paper Division held a five day sales meeting in New York, followed by a five-day meeting with manufacturing and research personnel and inspection of the company's new pulp and paper making facilities at Berlin, N. H. Above seated left to right: W. A. Littlefield and G. F. Henderson. Standing first row: J. A. Elton, H. E. Moley, C. W. Mark, R. J. Van Nostrand. Second row: J. W. Noble, B. K. Babbitt, E. O. Hanson, F. C. Stakel.

Ryegate Mill Steps Its Production Up

EAST RYEGATE, Vt. — The Ryegate Paper Company has reached a production rate of 1,000 tons of paper a month, the highest since the mill began operations 42 years ago.

The firm — which sells most of its output to New York, Philadelphia and Chicago publishing houses — manufactures paper for magazines, rotogravure printing and Sunday newspaper supplements. Demand for these and other types of printing paper has far exceeded production for several years.

The major portion of the regular pulp used at the plant is ground here from wood either cut from the company's own timberlands or brought from farmers' woodlots or small logging operators. Sulphite pulp, which must be added to manufacture better grades of paper, is imported from Canada and the west coast.

The mill employs 126 men and 10 women. It has an annual payroll of $350,000 and paid $11,745.58 to the town of Ryegate in taxes for last year. Since 1944 the employees have worked under a contract between the company and Local 499, Pulp, Sulphite and Paper Mill Workers, AFL.

The paper company was incorporated in 1881, but construction on the mill was not started until 1905. The plant was completed and operations began in September, 1906.

Founders of the firm were W. D. Russell and Porter Farwell. R. E. Farwell joined the concern as general manager when construction of the mill started, and later became executive vice-president and treasurer. He retired from the posts in 1946, but continues as vice-president. On his retirement, his son, Thomas B. Farwell, became president and treasurer.

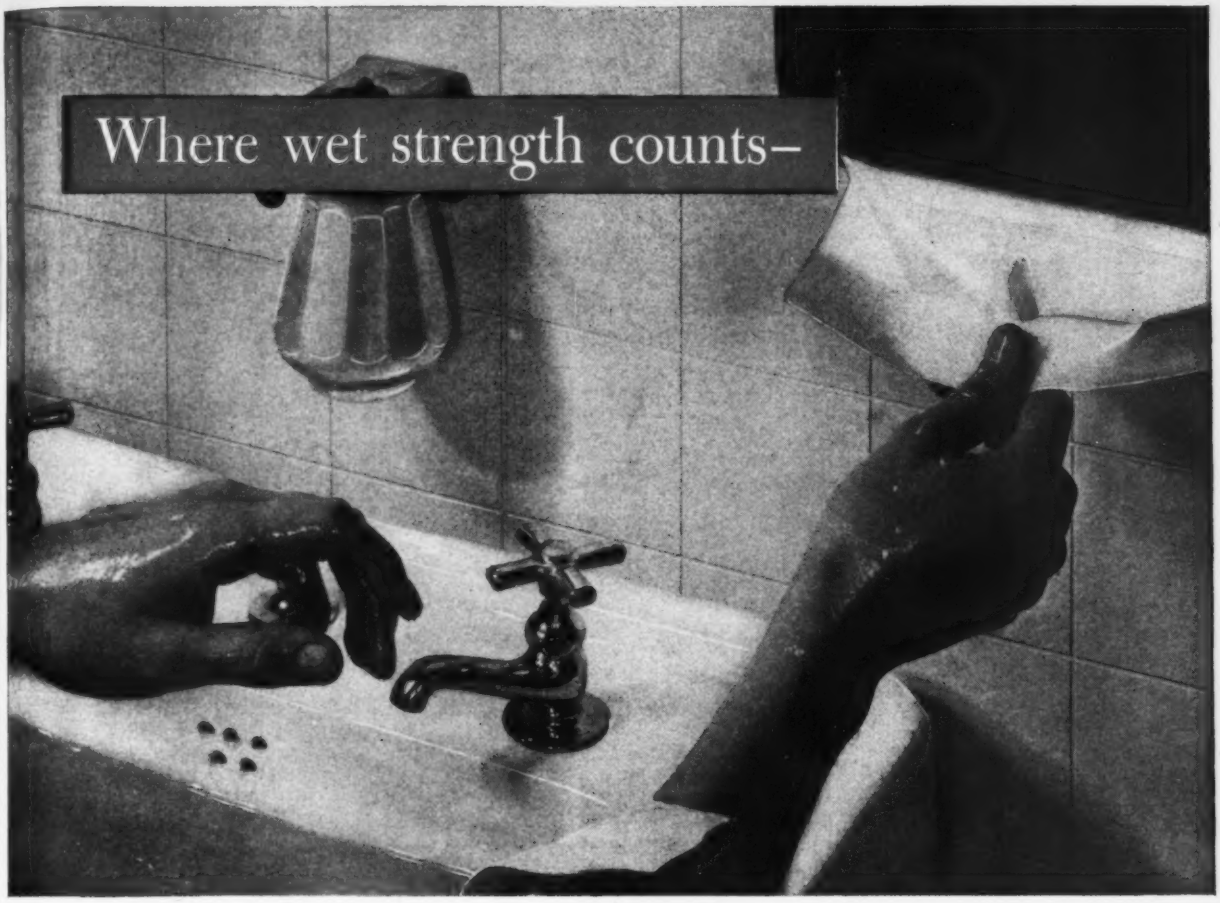
Late in 1946 control of the mill was purchased by interests identified with the Perkins-Goodwin Company, New York.

Since the control of the mill changed hands, a program of expansion and modernization has been instituted. Numerous pieces of new equipment have been added and additional improvements will be made as soon as materials are available.

Bahrenburg Joins Hammermill In Development and Sales Work

ERIE, Pa. — The Hammermill Paper Company has added to its development and sales staff Fred E. Bahrenburg, formerly assistant to the president at the Strathmore Paper Company.

Mr. Bahrenburg is a graduate of the College of Forestry, Syracuse University, where he majored in pulp and paper manufacturing. He has had an extensive experience in the manufacture and application of specialty and technical papers, a field that has received intense study by Hammermill Paper Company in recent years.



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UFORMITE 467 is particularly designed for use with Kraft by beater addition. UFORMITE 470 is recommended especially for sulfite stocks, can also be used advantageously with Kraft, rag and groundwood stocks, in the manufacture of high wet strength glassine, wrapping paper, chart and ledger paper or light weight absorbent tissues.

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And UFORMITES 467 and 470 do more than give you higher wet strength—they improve dry tensile and Mullen, fold, uniformity of sizing, and coating surface characteristics. Why not look into the many benefits resulting from these resins? We will be glad to send full details on request.

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THE RESINOUS PRODUCTS & CHEMICAL COMPANY

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Danziger Heads Slate Of Waste Dealers

NEW YORK — Sidney Danziger has been nominated for the presidency of the National Association of Waste Material Dealers, Inc. Mr. Danziger is at present a vice-president of the Association and for some years has headed the organization's entertainment committee. He is a vice-president and eastern representative of H. Kramer & Company, Chicago.

Under the new constitution and by-laws adopted by the Association last March, three vice-presidents and eighteen new directors are to be elected at the annual meeting to be held in Boston on March 24th. Those nominated are as follows: For vice-presidents: James T. Flannery, James T. Flannery Company, Jersey City, N. J.; Harris Goldman, Harris Goldman Company, Inc., New York City; Emanuel Hettleman, K. Hettleman & Sons, Inc., Baltimore, Md.

For directors for three years: William Abramson, A. Abramson & Sons, Inc., Newark, N. J.; Jean B. Charak, Federal Paper Stock Company, St. Louis, Mo.; Arthur J. Furth, Pioneer Paper Stock Company, Chicago, Ill.; Henry Lipkowitz, The Atlas Metal Company, Cleveland, Ohio; Stuart B. Sutphin, Jr., The I. V. Sutphin Company, Cincinnati, Ohio; Joseph H. Tyroler, Tyroler Metals, Inc., Cleveland, Ohio.

For directors for two years: Louis B. Cline, Cline and Bernheim, Nashville, Tenn.; John E. Fitzpatrick, Jos. Rosenthal's Sons, Inc., Philadelphia, Pa.; Morton A. Friedman, L. A. Cohn and Bro., Inc., Chicago, Ill.; J. Gluckson, Gluckson Wool Stock Corporation, Brooklyn, N. Y.; Peter Kahn, Jr., Philip Senegram Company, Los Angeles, Calif.; Abe Lapides, Lapides Metals Corporation, New Haven, Conn.; Louis Marcovitz, Loumar Textile By-Products, Inc., New York City; William J. McCauley, H. Muehlstein & Company, Inc., New York City; William T. McNamee, Penn Paper & Stock Company, Philadelphia, Pa.; Boris Petricoff, The Leshner Corporation, Hamilton, Ohio; Philip Scheibner, Associated Iron and Metal Company, Oakland, Calif.; Haskell Stovroff, Buffalo Waste Paper Company, Inc., Buffalo, N. Y.

Morton A. Friedman, chairman, and Joseph Epstein, secretary, Western Division, N.A.W.M.D., have made arrangements with the New York Central system to run a special all-Pullman train from Chicago to Boston for the 35th annual convention to be held in Boston from March 22 to March 24 with a pre-convention period from March 20 to March 21.

The special train will leave LaSalle Street Station, Chicago, on Saturday afternoon, March 20, at 2 p.m. and will make a stop at the Union Station in Cleveland at about 9 p.m. that evening to take on passengers from Cleveland and nearby points who will attend the convention. It is also expected that a car from Detroit and one from Cincinnati will join the train at Cleveland. The special train will arrive in Boston on Sunday morning, March 21.

The train will have dining cars and a club car for the enjoyment of the passengers. Present indication is that not more than one hundred and twenty-five persons may be accommodated.

Forest Products Group To Meet February 27

NEW YORK — TAPPI members, attending the annual meeting of that organization in New York City this month, are invited to stay over an additional day to attend the meeting of the Northeast Section of the Forest Products Research Society. This meeting will be held in the Hotel Pennsylvania on Friday, February 27, and will be attended by members and guests from the New England States, Eastern Ontario, Quebec, New Brunswick, New York, New Jersey and Pennsylvania.

Particularly interesting to F.P.R.S. members in the paper industry, and to TAPPI guests, will be the opening paper to be presented by William B. Darling, of the Riegel Paper Corporation, entitled "The Resin Impregnation of Paper during the Manufacturing Process." Ample time will be provided for discussion following the presentation.

R. A. Muller, vice-president in Charge of Production, of the Atlas Plywood Corporation, will deliver a significant message at the noon luncheon. Programs and additional details may be obtained by writing to James F. Hamilton, Regional Board Member for the Northeast, at the Perkins Glue Company, Lansdale, Pa.

Paper Advertisers Defer Annual Meeting Date

NEW YORK—Members of the Paper makers Advertising Association recently voted to change the date of their annual luncheon meeting and election of officers from being held during the American Paper & Pulp Association convention in February to the National Paper Trade Association convention in April.

The annual luncheon and election of officers will take place in the Florentine Room, of the Hotel Lexington, New York City, on Tuesday, April 6th. The feature speaker of the meeting will be C. B. Larrabee, president and publisher of Printer's Ink Monthly.

Erie Group Elects Guelcher

ERIE, Pa. — Carl W. Guelcher, assistant personnel director of the Hammermill Paper Company, was installed recently as president of the Erie Industrial Relations Council at a meeting in the East Erie Turner's Club.

TAPPI Rounds Out Its Meeting Program

NEW YORK — The principal speaker at the annual luncheon of the Technical Association of the Pulp and Paper Industry on Thursday of convention week will be Brig. Gen. W. E. Brougher, Commandant of Camp Gordon, Georgia. General Brougher has an outstanding reputation as a speaker. He was one of General Wainwright's officers at Bataan and was captured and interned in Japan during the succeeding months of the war. Although the General has not made known the topic of his address his previous talks have commented on the world situation and the things that are being done and need to be done to prepare this country for any emergency.

Additions to and revisions of the annual TAPPI meeting program have been made since its publication last week. They are:

MONDAY, FEBRUARY 23rd — *Containers Session* — 2 p.m. — 1. Instrumental and Operational Variables of the (Jumbo) Mullen Tester, by R. C. McKee, Carlton Rood, and Lewis B. Ayres, Institute of Paper Chemistry; 4. A Method for the Determination of the Resistance of Paper and Paperboard to Penetration by Fungi, by B. F. Shema, Institute of Paper Chemistry.

TUESDAY, FEBRUARY 24th — *Graphic Arts Session*—9:15 a.m.—2. Gloss Recorder With Automatic Standardization, by Richard S. Hunter, Henry A. Gardner Laboratory.

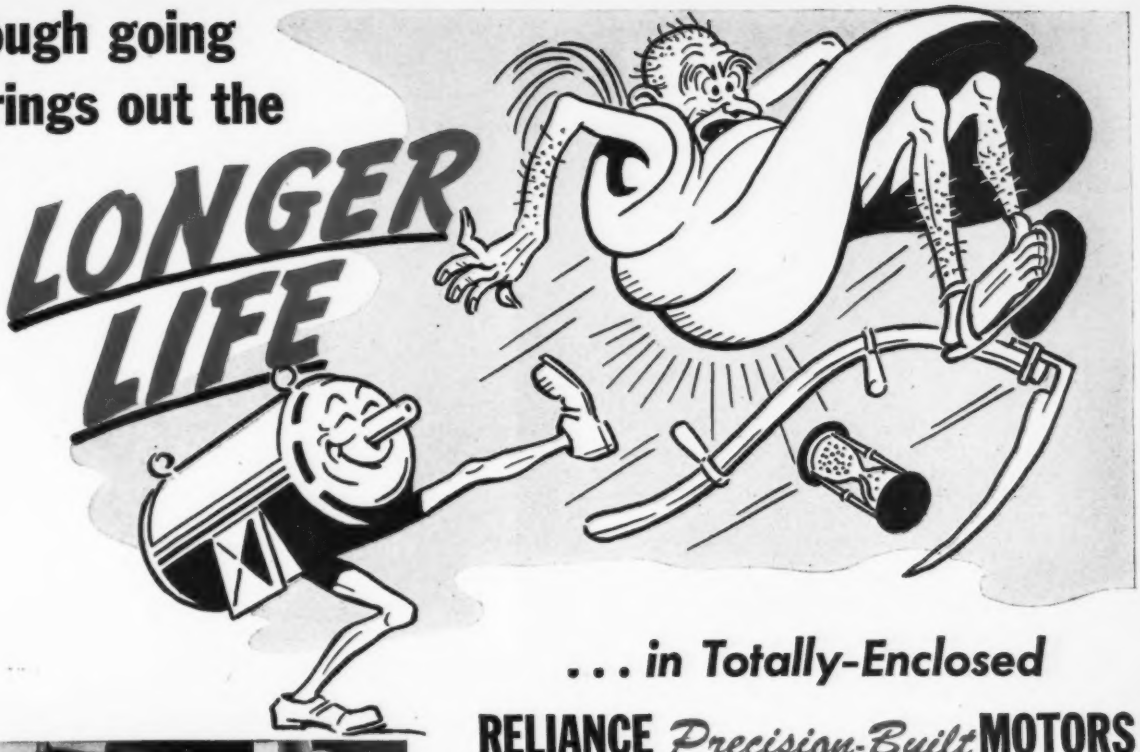
Fibrous Agricultural Residues Session—9:15 a.m.—4. Anaerobic Decomposition of Strawboard Wastes, by Don E. Bloodgood and J. C. Hargleroad, Purdue University.

Research Development Session — 2 p.m. — 2. The Effect on Pulp Quality of the Stepwise Removal and Replacement of the Hemicelluloses from Aspen Holocellulose, by Robert E. March, Institute of Paper Chemistry; 5. The Solubility of Sulphur Dioxide in Ammonium Bisulphite Solutions, by D. E. Marriner and Roy P. Whitney, Massachusetts Institute of Technology; 6. The Solubility of Sulphur Dioxide in Calcium Bisulphite Solutions, by C. K. White, Jr., J. E. Vivian, and Roy P. Whitney; 7. A Study of the Origin of the Kraft Color, by W. W. Pigman and W. R. Czellak, Institute of Paper Chemistry.

Vocational Training Session—2 p.m. —4b. Industrial Training at the Union Bag and Paper Corporation Mill in Savannah, by J. H. Groves; 4c. The Correspondence Courses of the Pulp and Paper Industry, by J. N. Stephen-

(Continued on page 22)

Tough going brings out the LONGER LIFE

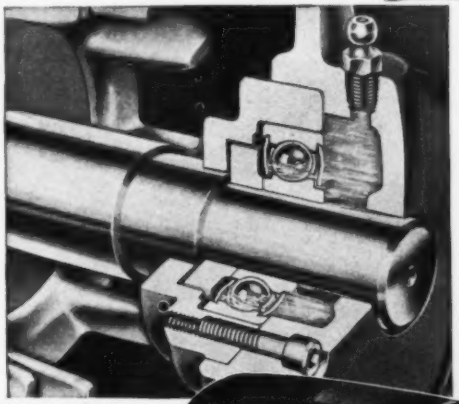


. . . in Totally-Enclosed RELIANCE *Precision-Built* MOTORS

Wherever motors operate frequently under abnormal conditions, Totally-Enclosed, Fan-Cooled Reliance A-c. Motors continually amaze users by their longer life. That important extra protection they have—against moisture in the air, against liquids splashed or streamed right on them, against dust and abrasives—pays so much more than it costs!

There's *extra* protection inside, too—to make that longer life of dependable service doubly sure. Ventilation that licks the heat problem is provided by air drawn through end bracket and directed by baffles through streamlined passages.

Thirteen-point winding treatment includes six special steps to assure the most effective insulation possible. And an improved bearing design eliminates all lubrication worries! Write today for Bulletin C-125 (Bulletin C-218 if interested in D-c. motors).



This special bearing design protects Reliance Precision-Built Motors indefinitely!

Reliance Totally-Enclosed, Fan-Cooled, Precision-Built Motor. *For convenience, conduit box of Reliance Motors may be mounted in any of four positions or completely eliminated, as shown here.*

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RELIANCE A-C D-C MOTORS

"Motor-Drive is More Than Power"

FINANCE

Federal Power Group Clears Wisconsin Dam

WISCONSIN RAPIDS, Wis.—The Federal Power Commission at Washington has cleared the way for construction and operation of a hydroelectric project on the Wisconsin River. It authorized a 50-year license for the Wisconsin River Power Company of this city last week. State of Wisconsin authorization already has been given. The commission also authorized the company to issue $8,500,000 in first mortgage bonds and $3,600,000 par value of common stock to pay initial construction costs.

The project will consist of two developments. The Petenwell project will include an 8,500 foot dam northeast of Necedah, a power house containing four 7,200-horsepower turbines connected to four 5,000 kilowatt generators, and a reservoir of 21,000 acres.

The Castle Rock development, 15 miles downstream from the Petenwell dam, will include a dam 2,831 feet long, a reservoir of 16,500 acres and a power house containing five 4,300 horsepower turbines connected to five 3,000 kilowatt generators.

Officials of Consolidated Water Power and Paper Company, one of the purchasers of the energy to be produced by the developments, said that work has already started on the Petenwell project and that it would start on the Castle Rock development this summer.

At Petenwell, much of the excavating has been done, and the company expects to start pouring concrete for the dam April 1. The dam is expected to be ready for operation by July 1, 1949.

Completion of the Castle Rock dam is contemplated by January 1, 1950.

The commission dismissed an application filed several years ago by Consolidated Water Power & Paper Company for a license for a project using both sites.

United Wallpaper Sales Sag for Six Months

CHICAGO—Directors of United Wallpaper, Inc., late last week declared a regular quarterly dividend of 50 cents per share on the 38,610 shares outstanding of the 4 percent cumulative convertible preferred stock, according to William H. Yates, president. The dividend is payable April 15, 1948 to stock of record at the close of business April 1, 1948.

Net sales of United Wallpaper, Inc., and domestic subsidiaries for the six months ended December 31, 1947, were $6,991,314, Mr. Yates stated. This compares with $9,567,210 for the similar 1946 period. Net profits before taxes were $407,591 and $232,196 after taxes against $1,677,450 and $1,026,277 respectively for the same period in 1946. Net earnings per share on common stock are equivalent to 16 cents compared with 83 cents for the first half of the 1946 fiscal year.

Traffic League Elects Bolton

VANCOUVER, B. C. — G. R. Bolton, traffic manager, Pacific Mills, Ltd., has been elected as chairman of the B. C. Division of the Canadian Industrial Traffic League.

Dryden Stock Sale Raises Half Million

TORONTO — Dryden Paper Company has announced that at a meeting of the company's directors they accepted a subscription for 20,000 shares of unissued common stock at $25 a share. The subscription was received from a company which is not at present a shareholder and in which none of the directors of Dryden is interested. Proceeds of the sale will be used by the company to pay off its bank loan in whole or in part and for other corporate purposes of the company.

Under a contract dated May 10, 1947, an option was given to managing directors of Dryden to purchase 10,000 shares of unissued capital stock at a price of $19 per share, this price being the approximate market price that prevailed at the time the option was granted.

The agreement calls for the purchase of 2,000 shares on or before Aug. 1, 1950; 3,000 shares by Aug. 1, 1952; 2,000 shares by Aug. 1, 1954; and 3,000 shares by Aug. 1, 1957. The optionee is free to exercise his option on the entire quantity at any time during the period, but on failure to take any particular lot within the dates mentioned, that particular part of option would become null and void. As of December 1, 1947, a total of 2,000 shares had been taken up under the option agreement.

As of September 30, 1947, the company showed a special loan of $600,000 and a secured loan of $157,000. Managing Director E. L. Goodall was named in the option.

FINANCIAL RECORD OF THE WEEK

New York Stock Exchange

High, Low and Last for Week Ending February 7, 1948

STOCKS

	High	Low	Last
A. P. W.	4¾	4½	4⅝
Armstrong Cork Co.	44⅜	43⅛	43⅛
Armstrong Cork Co., pf.	89½	88¾	89½
Celotex Corp.	25⅝	23¾	24¾
Celotex Corp., pf.	20	19¾	19¾
Certain-Teed Products Corp.	16	14⅝	14⅝
Certain-Teed Products Corp., pf.	....	....	....
Champion Paper & Fibre Co.	19¾	18¾	19
Champion Paper & Fibre Co., pf.	96¾	94	94½
Congoleum Nairn Co.	30⅞	29	29½
Container Corp. of America	39	37	37½
Container Corp. of America, pf.	....	....	....
Crown Zellerbach Co.	30	27⅝	28⅜
Crown Zellerbach Co., pf. 4.20	94¾	94	94
Crown Zellerbach Co., 4 pf. 4	109½	104	104
Dixie Cup Co.	33½	32	32
Dixie Cup Co., A	50	50	50
Flintkote Co.	34⅛	31¾	34
Flintkote Co., pf.	99	98¾	99
Robert Gair	9	8	8⅛
Robert Gair, pf.	19⅛	19	19⅛
International Paper Co.	50½	46¼	48
International Paper Co., pf.	92	91	92
Johns-Manville Corp.	37¾	35	35⅞
Johns-Manville Corp., pf.	104	103	103
Kimberly-Clark Corp.	20⅝	20	20⅛
Kimberly-Clark Corp., pf.	100½	98	98
Mac Andrews & Forbes	37	36¼	36¼
Mac Andrews & Forbes, pf.	....	....	....
Marathon Corp.	21⅜	19½	20½
Mead Corp.	19	18¼	18⅜
Mead Corp., pf. 4¼	90	89½	89½
Mead Corp., pf. 2	40¼	40¼	40¼
National Container Corp.	13¾	12¼	12⅜
Paraffine Companies, Inc.	71½	69½	69½
Paraffine Companies, Inc., pf.	102	100¼	102
Rayonier, Inc.	26	23⅛	24⅞
Rayonier, Inc., pf.	32½	32	32
Ruberoid Co.	61	57	57½
St. Regis Paper Co.	9¼	8⅝	8⅞
St. Regis Paper Co., pf.	81¼	80	80
Scott Paper Co.	43	42½	42¾
Scott Paper Co., pf.	93¾	92⅜	92⅝
Sutherland Paper Co.	40½	39½	39⅞
Union Bag & Paper Corp.	31¾	29½	30¼
United Board & Carton	13¼	13	13
U. S. Gypsum Co.	96⅜	93	95¼
U. S. Gypsum Co., pf.	175	170¾	175
United Wallpaper	5⅛	4½	4¾
United Wallpaper, pf.	31½	31½	31½
West Virginia Pulp & Paper Co.	42¾	41½	42⅜
West Virginia Pulp & Paper Co., pf.	104½	103½	104½

BONDS

Celotex Corp., 3¼s, '60	99	99	99
Certain-Teed Products Corp., 5½s '53	....	....	....
Champion Paper & Fibre Co., 3s '65	98	98	98
Mead Corp., 3s '68	....	....	....

New York Curb Exchange

High, Low and Last for Week Ending February 7, 1948

STOCKS

	High	Low	Last
Great Northern Paper Co.	41⅜	41¼	41¼
Taggart Corp.	11¼	10¾	10¾

The Ideal SAVEALL Setup

1. Oliver Filter
2. with Wood Drum
3. and choice of Rubber-Lined, Stainless Steel, Tile or Coated Vat

This recommendation is based on a study of several hundred Oliver Savealls over a period of nearly thirty years. Naturally, we recommend the Oliver as the recovery unit but having used all sorts of materials of construction we are convinced that for most installations nothing can equal the wood drum for economy and durability. This is proved by operating records. And to insure non-contamination of stock, we recommend the use of one of these materials for the vat: rubber lining, stainless steel, tile, or special coating.

The Oliver Saveall also offers the choice of three sheet dischargers—Oliver Denhard, Hydrair or Roll—thus adding to its effectiveness.

If you want to save fiber, filler and water for re-use with the unit already used by several hundred paper mills, you will want the Oliver.

OLIVER UNITED FILTERS INC

UF INC.

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California

Chicago 1, Ill.
221 N. LaSalle Street

Western Sales Division
Oakland 1, Calif.
2900 Glascock Street

Sales & Manufacturing Representative:
E. Long Limited
Orillia, Canada

Factories: Oakland, Calif. • Hazleton, Pa. • Orillia, Canada • Melbourne, Australia

Nekoosa Installs New Cutter and Trimmer

PORT EDWARDS, Wis. — In line with the program calling for the streamlining of production facilities in the Port Edwards finishing department of Nekoosa - Edwards Paper Company, two new pieces of equipment have recently been installed and certain changes in machinery placement have been made. The new equipment, in operation since December, consists of a Hamlet paper cutter and a Seybold precision trimmer. Increased conversion of fine papers to sheets is made possible through the operation of the new machinery.

A Maxson overlapping delivery is incorporated in the Hamlet paper cutter along with a Reliance fully electrified drive making possible very high speed operation. The cutter will accommodate rolls up to 114 inches in width and it replaces cutter No. 1 which has been dismantled. Other features of the new cutter include improved swing knives for higher speed operation and an increase in the maximum sheet sizes that can be handled. In order to make room for the new cutter a change was made in the arrangement of the other cutters. No. 1 was dismantled and No. 2 was moved to a position along the east wall of the finishing department where it is now used for sheeting small size rolls such as wrappers, samples and end rolls.

The new Seybold trimmer will handle sheets up to 85 inches in width and is faster in operation than trimmers of earlier design. Among the more recent advancements incorporated in its construction are an improved type of broke return and a more readable scale for greater accuracy in setting the sizes. The trimmer is located in the southeast section of the finishing department and is used primarily for trimming papers to be packed on skids. Both the trimmer and the cutter are proving to be important factors in stepping up the conversion of paper from rolls to sheets in the Port Edwards finishing department.

Marathon Installs Gum Mixing Machines

MENASHA, Wis. — Two new gum mixing machines were installed last week at Marathon Corporation, at an estimated cost of about $70,000. The two machines were moved January 30 into the parafilm department after being in storage for over a year. The building had to be reinforced to support the machines which weigh 40,000 pounds each.

A section of the building wall had to be removed so that the large pieces of equipment could be hoisted into the second floor of the building on River Street. The machines are powered by a hundred horsepower motor and will handle the heavier viscosity gums. The gums are mixed for coating on gummed paper and cheese wrappers.

Several much smaller obsolete machines are being replaced by the two new machines. The smaller machines will be kept for auxiliary use.

CONTAINER CORP. OF AMERICA OPENS FOLDING CARTON PLANT

Container Corporation of America's new folding carton plant at Greensboro, North Carolina, begun in 1946, is now in limited operation. As the first of the company's fabricating plants to be built to its own specifications, the plant is a model of modern industrial architecture and efficient layout. Designed by the Ballinger Company, architects and engineers, Philadelphia, with Walter Gropius, chairman of the Department of Architecture at the Harvard University Graduate School of Design, acting as consulting architect, the plant includes many unusual features which add to the comfort, safety and convenience of employees. Other innovations provide maximum efficiency in the handling of materials, flow of production and maintenance. Scientific use of colors and artificial lighting to eliminate glare and eye-strain in all interior areas, loading and unloading facilities for freight cars and trucks within the well-heated, well-ventilated building, and interior wall surfaces of glazed tile, easy to clean, are typical elements of advanced design found in the plant.

Flambeau Installs New Size Press

PARK FALLS, Wis.—The Flambeau Paper Division of The Kansas City Star Company on February 1 started to install a Beloit size press on its No. 2 machine which trims 122 inches, together with 11 dryers, a General Electric variable speed electric motor drive and other equipment for improving quality of paper and increasing the production of the machine.

The size press is equipped with two rubber covered press rolls with pneumatic loading. On this press, the surface size may be applied to either or both sides of the seet as desired, in varying amounts. Wrinkles are avoided with the Beloit fan system which balloons the sheet up from the bottom to provide a uniform tension all the way across the machine. The tension prevents wrinkles, folds or puckers being carried into the after dryer section.

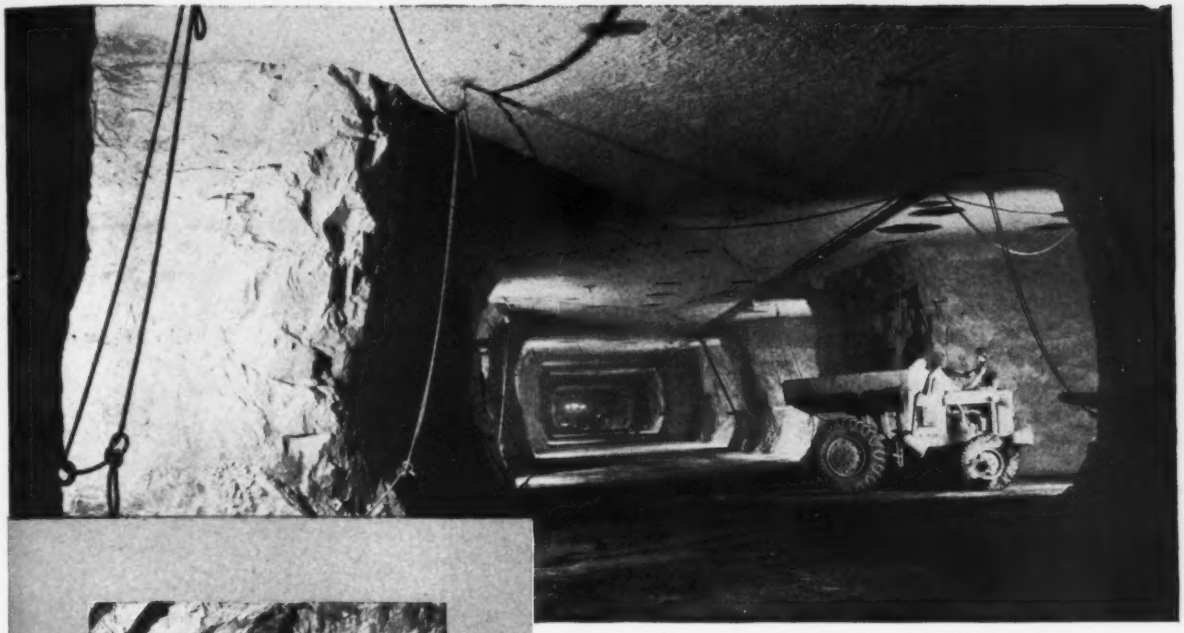
Starch or other sizing material is prepared in a series of tanks designed and laid out by Penick and Ford. Gould pumps transfer the size from the beater room to the machine room basement and also supply the Size Press from the constant level tank. Foreign material is removed from the size as it is pumped from the storage tank to the holding tank with two Andale removable basket type filters, covered with 40 mesh wire cloth. They operate in parallel so that either may be cleaned and still maintain the operation of the size system through the other. All the fittings, valves and piping are copper and bronze to inhibit slime growth. The temperature of the size system is thermostatically controlled to maintain uniform viscosity.

The starch system is quite flexible. The size may be made up in quantity for 60 hours in advance, or it may be operated to supply alternately as many as three different size mixtures for various grades of paper, rotating from one mixture to another. Also, a long run of one mixture may be interrupted in the middle with a different mixture without dumping any tanks or stopping the flow to the size press.

Four new dryers have been added to the old dryer section and seven more dryers installed after the Size Press. The whole dryer section and Size Press are equipped with rope carriers which catch the sheet just after it leaves the dual press and crries it to the Size Press. The second set of ropes carries the seet through the size press and over the last seven dryers. The dryers are equipped with Nash felt guides, Beloit dryer felt tighteners and a Broughton drainer system, including Midwest Fulton flexible joint syphon pipes and Johnson steam joints.

Constant control of moisture in the finished paper is maintained with a Stamm Automatic steam regulator.

(Continued on page 31)



Photographs show vast size of limestone mine operation. Shovels are 1½ yard, electrically powered; trucks are Diesels.

World's deepest

LIMESTONE MINE

TO AUGMENT RAW materials supplies, Columbia mined 2,200 feet for limestone—almost beneath its plant at Barberton, Ohio.

The operation is notable in a number of other ways. Modern equipment of great size—capable of moving 300 tons of stone per hour—was assembled underground. The stone is screened and crushed; then brought to the surface by a semi-automatic hoist which attains a speed of 2,000 feet per minute and automatically brakes and dumps at the top.

This is another of numerous developments pioneered by Columbia for improved production and service to industry . . . Pittsburgh Plate Glass Company, Columbia Chemical Division, Pittsburgh 13, Pa. Manufacturers of Soda Ash, Caustic Soda, Liquid Chlorine, Sodium Bicarbonate and other alkalies and related essential industrial chemicals.

COLUMBIA CHEMICALS

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PITTSBURGH PLATE GLASS COMPANY

Downingtown Elects Enright A. Ellis

DOWNINGTOWN, Pa. — Following a recent meeting of the Directors of the Downingtown Mfg. Co., Chairman of the Board Ellis Y. Brown, Jr., made known that Enright A. Ellis had been elected president. He continues in the position of treasurer, which he formerly held.

Enright, son of "Charlie" Ellis, a former president of the company, came with the firm on June 8, 1934. He had graduated from the University of Maine, with a Chemical Engineering Degree from the Pulp and Paper Division, after which he went with the Veldown Co. of Glens Falls, N. Y., where he worked in all operating departments. He became assistant general manager and director of Downingtown on January 16, 1941 and in March, 1944, became vice-president in charge of manufacturing. In August, 1946, he was elected vice-president and treasurer.

During his first few years with the company, Enright Ellis served in the sales department and, of course, traveled all over the country visiting mills, particularly in the South. He is a member of TAPPI, the Newcomen Society, and the University of Maine Alumni Association, and has a host of friends in the paper industry.

At the same meeting, Oscar C. Cordes was elected a director of the company and vice-president in charge of sales; Harry C. Merritt, vice-president in charge of engineering; and Andrew E. Walker, vice-president in charge of manufacturing. Ellis Y. Brown, 3rd, continues as secretary, and Ellis Y. Brown, Jr., who retired as president in 1946, remains chairman of the board of directors.

At the same meeting, Harry L. Lower was named controller and G. Clifton (Clif) Walton, director of public and industrial relations. Clif is a member of TAPPI and the Engineers Club of Philadelphia.

Oscar C. Cordes has been with the sales department of the company for fourteen years and recently has been assistant sales manager. Prior to his association with Downingtown, he spent some fourteen years in the general engineering department of Westinghouse Corporation, working on paper mill applications. During this period he patented a number of devices applying electrical controls to papermaking equipment. He graduated from Cooper Union with a degree of B. S. in Electrical Engineering, and is a member of TAPPI.

Harry C. Merritt joined the company in 1940 as assistant chief engineer. He is well known in the industry and was formerly plant engineer for Hollingsworth & Vose, East Walpole, Mass., for many years. He is a graduate of Worcester Polytechnic Institute, with a B. S. Degree in Mechanical Engineering, is a member of the American Welding Society and also a member of TAPPI.

Andrew E. Walker came to the Downingtown company in 1902 to learn the machinist's trade. He grew up with the company and was shop superintendent commencing January 1, 1940 and during the trying days of the last World War when the company was building for the Army, Navy and various war industries.

ENRIGHT A. ELLIS

OSCAR C. CORDES

Capehart Finds Problems In Alaskan Development

(Continued from page 7)

ful survey of the housing problem in Alaska must be made by The Housing and Home Finance Agency in light of proposed pulp developments.

While it is true that the Ketchikan, Sitka, and Juneau sites will probably be located adjacent to the towns, these towns already face a serious housing shortage and it will be necessary to build new houses to accommodate the plant employees; in the logging areas it will be necessary to build logging camps, which do not present quite as much of a problem. In the Thomas Bay area, for which an advertisement has already been made, it will probably be necessary to construct an entirely new town capable of housing approximately 1,000 persons as the potential plant location is not adjacent to a presently existing town.

The subcommittee recommends that the Federal Power Commission, in cooperation with the Department of the Interior, complete the study of power resources at potential Alaskan pulp sites.

In some instances the power sites are located at appreciable distances from the plant sites, which may aggravate this problem. While the subcommittee has been assured that engineers of companies considering construction of pulp mills have taken into account the transmission problems and believe that they can be solved readily, it feels that careful attention to this problem may prevent serious upsets in development plans.

The subcommittee recommends that the Forest Service and the proper bureau of the Department of Labor give careful consideration to development of plans for labor recruitment. The cost of living in Alaska is very high. This is recognized officially by the United States Government, since Federal Government employees serving in the Territory of Alaska are given a 25 percent increase above the basic rate of pay for the grade in which they are classified. Therefore, the subcommittee can see that recruitment of labor may present some problem in the establishment of a pulp industry in Alaska. Certainly this is not an insurmountable problem, but the subcommittee feels it should be brought to light in this report.

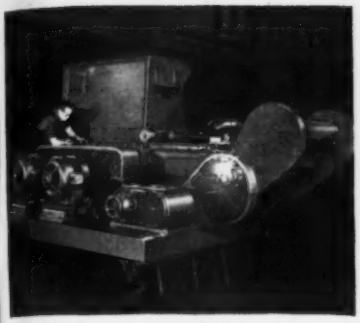
Bulkley, Dunton Dines Scott Staff at Springfield

SPRINGFIELD, Mass. — Bulkley, Dunton & Company of this city was host January 29 to officials of the Scott Paper Company, of Chester, Pa., at a dinner at the Hotel Sheraton. The event followed the completion of an arrangement whereby the local firm becomes industrial distributor for the Pennsylvania company.

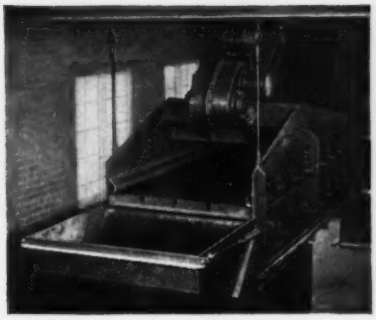
Jack Whitney, general manager of Bulkley, Dunton, presided for speaking after the dinner. G. H. Swatek, guest speaker and industrial sales manager for Scott Paper, was introduced by M. W. Pannebaker, Scott district manager.

Other speakers were F. Glenn Rink, New England industrial sales manager for Scott, and J. C. Marvin, vice-president of Bulkley, Dunton.

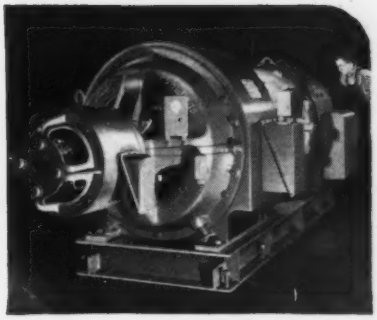
AIDS PROGRESS IN PULP AND PAPER



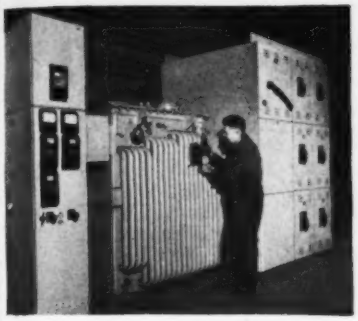
Defiberizer Utilizes Wood Waste



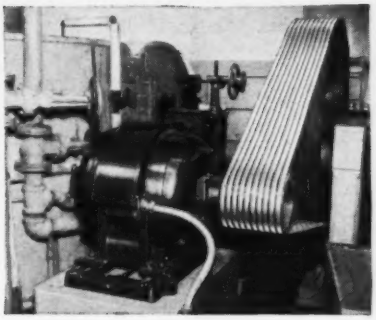
Improved "Low-Head" Chip Screens



Motor-Generator Sets



Flexible, Economical Unit Substations



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Tappi Rounds Out Its Meeting Program

(Continued from page 12)

son, Institute of Industrial Arts.

Pulping Session—2 p.m.—5. Deinking Studies III. Survey of a Production System by Screen Analysis, by H. P. Bailey, A. H. Nadelman, and E. F. Andrews, International Paper Company.

WEDNESDAY, FEBRUARY 25th—*Structural Fibrous Materials Session*—9:15 a.m.—3. Test Apparatus and Procedure for Determining Resistance to Impact and Concentrated Loads of Structural Insulating Board, by M. H. La Joy and Frank B. Rowley, University of Minnesota; 7. An Accelerated Method for Measuring the Penetration of Water in Insulating Board, by W. A. Wink and J. A. Van den Akker, Institute of Paper Chemistry.

Coating Session — 9:15 a.m. — 4. The Electronic Gloss Indicator as an Aid in the Control of Paper Finish, by Kenneth Bowers, Glens Falls Laboratory, Inc.

Water Session — 9:15 a.m. — 5. Sludge Contact Reactors in White and Waste Water Treatments, by V. J. Calise, Liquid Conditioning Corporation.

Statistics Session—2 p.m.—1. The Inspection Specifications as a Quality Contract, by J. G. Strieby, Kimberly-Clark Corporation; 4. The Control Chart in Sulphite Acid Plant Operations, by W. W. Marteny, Falls Power and Paper Company; 5. Statistical Quality Control Applied to Paper-Foil Lamination Process, by Arthur C. Dreshfield, Hollabaugh and Dreshfield; 6. Statistical Methods in the Research Laboratory, by Maynard S. Renner, Dewey & Almy Chemical Company; 7. The Error of a Nomagram for the Calculation of Clark Softness, by Geoffrey Beale, R. P. Anderson, and A. A. Harvey, Institute of Paper Chemistry.

Coating Session—2 p.m.—1. The Air Knife Method of Coating, by F. H. Frost, S. D. Warren Company; 2. Coating Paper on the Paper Machine by the Rotogravure Offset Method, by Gerald Haywood, West Virginia Pulp and Paper Company; 3. Colloidal Equipment Applied to the Homogenization of Clay and Paper Coatings, by David E. Gould, Eppenbach, Inc.; 4. Discussion — Machinery for Paper Coating — Calenders, E. E. Thomas, Appleton Machine Company; 5. Panel Discussion.

Water Session—2 p.m.—3. A Study of Slime Control in a Groundwood Mill, by B. F. Shema, J. B. Anderson, and J. W. Appling, Institute of Paper Chemistry; 4. Economic Considerations of Feedwater Conditioning, by F. N. Kemmer, Cochrane Corporation

THURSDAY, FEBRUARY 26th — *Preparation of Papermaking Materials Session*—9:00 a.m.—2. Rag Mill Hydrafining, by H. P. Espenmiller, Dilts Machine Works, Fulton, N. Y.

Plastics Session—9:00 a.m.—2. Viscosity and Stability of Concentrated Suspensions and Emulsions, by F. R. Eirich, Polytechnic Institute of Brooklyn.

Mill Instrument Control Session—9:00 a.m.—1. Flow Measurement and Control, by W. S. Yunger, Foxboro Company; 2. Temperature Measurement and Control, by John Chandler, Bristol Company; 3. Methods of Measuring Liquid Level, by Norman Gollin, Taylor Instrument Companies; 4. Control Valves and Positioners, by John R. Robins, Mason-Neilan Regulator Company.

College Alumni Luncheons Feature Paper Week

NEW YORK—A feature of growing interest and importance of Paper Week in New York (February 23-26) is found in the college alumni reunions. The following have been scheduled:

University of Maine, Commodore Hotel, Tuesday, February 24, at 12:30 p.m.

New York State College of Forestry, Hendrick Hudson Room, Roosevelt Hotel, Wednesday, February 25, at 12:30 p.m.

Massachusetts Institute of Technology, Engineers Club, 33 West 40th Street, Wednesday, February 25, at 12 M.

Ed Arnold's Friends Pay Him Honor

MAPLEWOOD, N. J.—Neighbors and friends of Ed Austin, some of his associates in the Perkins-Goodwin Company organization in New York, and business acquaintances of years standing turned out two hundred strong on January 29 at the Maplewood Country Club to a testimonial dinner in Ed's honor. His work as a civic leader in this suburban town, as a Legionnaire, a church worker, and all round man brought a long list of tributes from those who know his many sides. Ed was presented with a special gold medallion by Maplewood Post 80 of the Legion.

New England Merchants Will Meet February 17

BOSTON—The annual meeting, dinner and election of officers of the New England Paper Merchants Association, tentatively announced for February 10, will be held Tuesday evening, February 17, in the Roof Ball Room of the Parker House.

Inter-Society Color Council Will Meet March 2-3

NEW YORK—The Inter-Society Color Council, of which the Technical Association of the Pulp and Paper Industry is a member, will meet at the Pennsylvania Hotel, March 2-3. Following is the program:

TUESDAY, MARCH 2 — Reports on I-S.C.C. Problems — 2. Color Names by D. B. Judd; 6. Survey of Color Terms, by S. M. Newhall; 7. Survey of Color Specifications, by W. C. Granville; 10. Color Aptitude Test, by F. L. Dimmick and C. E. Foss; 11. Color Blindness Studies, by D. B. Judd and Le Grand Hardy; 12. Illuminating and Viewing Conditions in the Colorimetry of Reflecting Materials, by D. B. Judd; 13. The Illuminant in Textile Color Matching, by D. Nickerson; 14. Single Number Specifications for Transparent Standards, by R. H. Osborn.

PROGRAM OF WEDNESDAY, MARCH 3—Color Coordination in Industry (Discussion);

Color Coordination for a Housing Project, by I. A. Balinkin, University of Cincinnati;

Color Coordination for Human Efficiency and Safety, by Faber Birren, New York, N. Y.;

The Home Furnishings Style Council Plans, by Elizabeth Burris-Meyer, New York, N. Y.;

Color Engineering — A Dominant Factor in Human Relations, by H. Creston Doner, Libbey-Owens-Ford Company, Toledo, Ohio. (This paper deals with the daylight principle of maintenance painting in industrial plants.);

Application of Modern Colorimetry to Plastics, by George Ingle, Monsanto Chemical Company, Springfield, Mass.;

Color Coordination in Mail Order and Retail Merchandise, by Lucille Knoche, Chicago, Ill.;

The 1947 Frazer-Manhattan, by Carl Spencer, Detroit, Mich.;

Color Coordination in Variety Merchandise, by Helen D. Taylor, Philadelphia, Pa.

Anyone interested is welcome to attend these meetings and may obtain a copy of the final program from Walter C. Granville, Container Corporation of America, 38 South Dearborn Street, Chicago, Ill.

Stough Organization Adds Terry to Expand Operations

CHICAGO — Robert A. Stough Company, Inc., this week made known that William F. Terry has become associated with the company. Mr. Terry will expand the operations to Illinois, Iowa, Wisconsin and Missouri, giving thorough coverage for the manufacturers represented by the concern.

A recent fire in the warehouse at 6247 Indiana Avenue destroyed $20,800 worth of assorted paper goods belonging to the Stough company. Mr. Stough, at his office, announced that the loss was entirely covered by insurance. There will be no interruption in supplying paper to customers.

You Need MH* to Reduce Costs!

*"M H" is MASS HANDLING —the systematic movement of the most units, in the shortest time, at the lowest cost.

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RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

Lukens Initiates Its New Descaling Plant

COATESVILLE, Pa. — Installation of what is believed to be the largest, most modern, and most complete sodium hydride descaling plant in the world, has been made known by Lukens Steel Company. The equipment, installed at a cost of approximately $750,000, can be used on all Lukens Clad Steels, including Nickel - Clad, Stainless - Clad, Inconel-Clad and Monel-Clad, on alloy steels and on all metals which are not affected by molten caustic or by heating at 700°F., for the removal of metallic oxide scale, and to impart an attractive pearly gray matte finish to plate surfaces.

Appreciable savings in metal, more uniformly descaled surfaces, and shorter descaling time are the principal advantages offered by the sodium hydride process over blast cleaning. Metallic oxide scale is removed by first immersing the work in the sodium hydride bath and then immersing it, while hot, in a water quench tank. The scale, loosened by the sodium hydride bath, is carried off the work by steam which is created when the heated work is immersed in the water quench. The reaction stops when the reducing action on the scale is finished; overtreatment has no effect on the underlying metal.

The sodium hydride bath may be likened to an alkaline pickling bath which requires no electric current. In the course of removing scale, which is accomplished without contaminating the bath, caustic soda results from the reaction of sodium hydride and metallic oxide.

Lukens' new facilities for sodium hydride descaling include a large preheating furnace where the work is brought to a temperature of 700°F. This preheating is necessary to prevent cold work from lowering the temperature of the sodium hydride bath to less than its constantly maintained 700°F.

From the furnace, the work is lowered into the sodium hydride bath which is produced by the reaction of sodium and hydrogen. Theoretically, each pound of sodium requires 7.8 cubic feet of hydrogen which is obtained from ammonia gas in a dissociator from which nitrogen passes off as an inert gas. As the hydrogen feeds into mixing boxes in the sodium hydride tank, excess hydrogen is burned off continuously to show that it is being fed properly to maintain the correct solution in the tank.

The work remains in the sodium hydride solution from 8 to 20 minutes. Then it is quenched in the adjacent water tank, where the steam which is generated helps remove the loosened scale from the surface.

As a preliminary to pickling, the work is immersed in a sulfuric acid bath to neutralize any remaining caustic and is then brightened by dipping in a nitric-hydrofluoric acid bath. Following these pickling operations, the work is subjected to a holding bath in water, then to a high pressure spray to remove all acid. The final bath is a hot water rinse, resulting in a clean, bright surface.

Mason-Neilan Names Head To Manage Atlanta Office

BOSTON — Mason-Neilan Regulator Company has appointed E. Putnam Head as manager of its Atlanta office located at 101 Marietta Street.

Mr. Head joined the Mason-Neilan factory staff in 1936. He was appointed to the sales engineering staff in the New York office in 1937 where he remained until 1939 when he returned to Boston, joining the factory staff as production supervisor during the war years. Mr. Head was then appointed manager of the Buffalo office.

Monsanto Names New Public Relations Member

ST. LOUIS—Monsanto Chemical Company has appointed Gertrude Bailey, of New York city, to the staff of the Department of Industrial and Public Relations effective February 3. Miss Bailey will be the department's New York representative with headquarters at 445 Park Avenue. A native of Detroit, she formerly was with the William Esty Advertising Company. Prior to that she was woman's page editor of the New York *World-Telegram.*

RAYMOND T. DEPAN

who has been appointed development engineer for Downingtown Manufacturing Company, Downingtown, Pa. He is a graduate of the pulp and paper course of the New York State College of Forestry, Syracuse, Class of 1940. He has had six years' experience in development and research work for the Flintkote Company of East Rutherford, N. J., and one year as plant manager of the Mt. Carmel Roofing Felt Mill of the Flintkote Company.

Shartle Sponsors Lecture Course

MIDDLETOWN, Ohio — A series of fourteen lectures by paper-making authorities has been scheduled by Shartle Bros. Machine Company. The program started January 7 with 100 men in attendance at the first meeting. Invitations to the lectures were extended to men in a number of mills within reasonable distance of Middletown. The lectures were arranged for their benefit, as well as to broaden the viewpoints and bring practical information to people in the Black-Clawson, Dilts, and Shartle organizations. The company regards this contact with paper makers highly valuable to its personnel who are engaged in engineering and building paper mill machinery.

Meetings are held in the Shartle schoolroom which is excellently suited to the purpose, with ample accommodations for all who can arrange to attend.

The Manufacture of Pulp by the Sulphate Process — W. F. Gillespie, Gaylord Container Corporation.

Kraft Paper and Board Manufacture in the South — W. R. Adams, St. Regis Paper Company.

Modern Practice in Waxing Tissue Manufacture — Wm. F. Hathaway, Kalamazoo Vegetable Parchment Company.

General Manufacture of Book Papers —Nelson Benzing, Champion Paper & Fibre Company.

Duties of a Laboratory Technician in the Paper Mill—Prof. B. L. Kassing, N. Y. State College of Forestry.

Modern Practice in the Manufacture of Liner Board—M. F. Knach, River Raisin Paper Company.

Machine Coating and Paperboard Manufacture — Dr. Duncan Brown, Gardner-Richardson Company.

Modern Practice in the Manufacture Set Up of Folding-Box Board—Fred Crysler, Container Corporation of America.

Manufacture of Paper Felt—Joe Hartford, Philip - Carey Manufacturing Company.

Manufacture of Straw Paper — S. I. Aronovsky, U. S. Department of Agriculture.

Drying Paper on the Machine — Harold Young, Midwest Fulton Machine Company.

Application of Vacuum to the Paper Industry—Carl Clark, Clark & Vicario Company.

Designs and Requirements for Modern Mill Power Plants — Frank Hollis, Alton Boxboard Company.

Manufacture of Paper for the Plastic Field — D. Yost, and John Owens, Sorg Paper Company.

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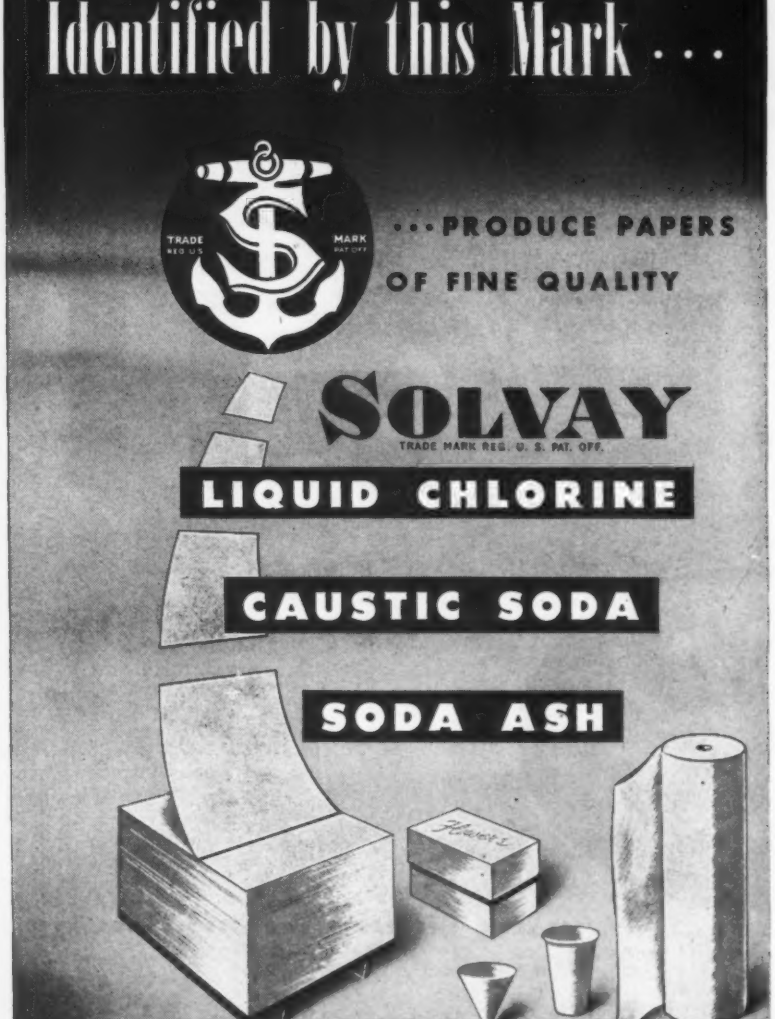
LOCKPORT FELT COMPANY • NEWFANE, NEW YORK

Order Aims at Reduction Of Pollution

MADISON, Wis.—An order was to be issued this week directing four industries, the Outagamie county asylum and the Neenah-Menasha sewage plant to reduce or eliminate pollution and silting of Little Lake Butte des Morts. The order, which sets a time limit for compliance, was drafted by the State Committee on Water Pollution. It resulted after public hearings and investigations prompted from numerous complaints in the area.

The Bergstrom Paper Company and Badger-Globe mill of Kimberly-Clark Corporation were two of the firms involved. The committee found that they are discharging large amounts of waste liquids which contain suspended solids in larger quantities than the recommended minimum under state regulations. These deposits, the committee found, result in silting of the lake bed.

The state committee consists of officers of several state departments, including the state public service commission, the state board of health, and the conservation commission. Its orders have the effect of law. It has required many other pollution elimination measures in other sections of the state in the past.



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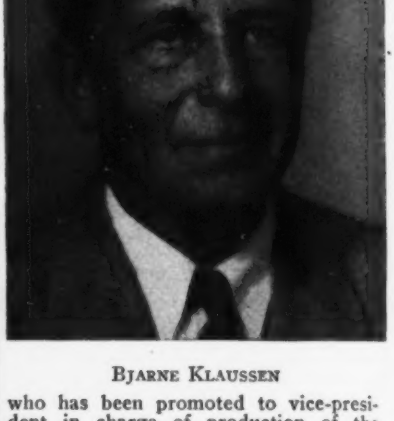


BJARNE KLAUSSEN

who has been promoted to vice-president in charge of production of the Hooker Electrochemical Company, Niagara Falls, N. Y. Mr. Klaussen, a graduate of the University of Oslo, has been a member of the Hooker organization since 1916. He has been works manager of the Niagara plant since 1940 and a member of the company's board of directors since 1942.

Moore & White Elects Pennock and Lehmuth

PHILADELPHIA—George M. Pennock, the firm's executive engineer, has been elected a vice-president of The Moore & White Company, Philadelphia manufacturers of paper-making machinery.

The board of directors also elected Plant Manager Henry Lehmuth, III, a vice-president, and reelected George Lear as president and Conrad J. Kern as board chairman.

W. E. Bodine was reelected a vice-president. C. F. Sandbeck, formerly secretary, was chosen treasurer, a post which Lear relinquished. M. E. Kelley was named secretary.

President Lear reported a profit for the revitalized company during 1947, the first full year under the present management. He added that orders already placed indicated that 1948 would be even better.

Hartley to Speak at Sapeye Luncheon

NEW YORK—The Salesmen's Association of the Paper Industry has secured Congressman Fred Hartley of New Jersey, co-author of the Taft-Hartley Law, as speaker at the Annual Luncheon to be held on February 25 at the Waldorf-Astoria. More than 900 reservations have been received for this luncheon. This is more than had been received last year at this time which indicates that a full house will greet Mr. Hartley.

Sensenbrenner Talks Of University Problems

APPLETON, Wis. — F. J. Sensenbrenner, retired chairman of the board of Kimberly-Clark Corporation and present chairman of the University of Wisconsin board of regents, addressed the Appleton Kiwanis club at a luncheon meeting on January 28. He discussed problems and achievements of the University and the board of regents in recent years. Among the great problems have been the tremendous expansion in enrollment at the University, the enlargement of its services to business, professional, labor, industrial and agricultural groups.

Mr. Sensenbrenner said that from 1929 to 1941 there were no significant additions to the physical plant of the University despite constantly increasing needs. Recently the legislature appropriated $8,600,000 for building of necessary structures, but skyrocketing costs have made it impossible to proceed. The appropriation represents only a small part of the total needed. He paid special tribute to the effectiveness of the school of commerce in rendering new service to the business men of the state. He said that his "pet job" on the board has been to increase University service to business of Wisconsin, especially to small firms which employ between 100 and 500 persons. These, he said, do not have the staffs or facilities for research.

"Until recently there was a somewhat unfriendly attitude between business and the university," he said. "The department of public service, headed by Frank Holt, and the establishment of the independent school of commerce headed by Dean Fay Elwell have to a large extent overcome that feeling. I hope the final result will be goodwill between the university and all the business of the state."

Connecticut Valley Superintendents Meet

SPRINGFIELD, Mass.—The Connecticut Valley Division of the American Pulp and Paper Company Superintendents' Association, recently marked its 25th anniversary with a meeting and banquet at the Hotel Sheraton here.

Seated at the head table were A. C. Loomis of Holyoke, secretary-treasurer of the Connecticut Valley Division; Raymond Bennett of Pisgah Forest, N. C., national president of the Association, and Raymond Winkler of Holyoke, chairman of the Connecticut Valley Division.

President Bennett delivered the principal address on the topic, "Sharing Your Knowledge."

Fox Installs New Jones Jordans

LOCKLAND, Ohio — The Fox Paper Company has purchased three new E. D. Jones Majestic Jordans, two of which are already in operation. All of these units are equipped with Type-W plugs, anti-friction bearings, and stainless steel Nowave plug and shell fillings. They are direct driven by 300 to 400 horsepower motors through telescopic couplings.

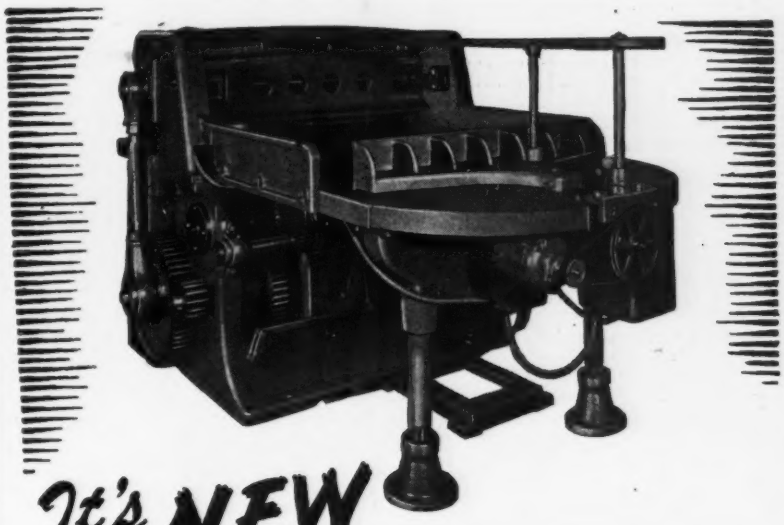
Lakeview Mill Celebrates Safety Record

NEENAH, Wis.—The engineering department of Kimberly-Clark's Lakeview mill entertained at a party January 30 in Germania Hall to celebrate a safety record of 400,000 man-hours of work without a single accident.

Western Waste Dealers To Meet March 1

CHICAGO — A meeting of the Western Division of the National Association of Waste Material Dealers, Inc., will be held at the Congress Hotel on Monday, March 1st. There will be a joint meeting of the Metal Divisions of the Association and also a joint meeting of the Waste Paper and Rag groups on Monday afternoon at two o'clock.

The meetings will be followed by dinner and entertainment to which the ladies are invited to attend.



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The Model "E" Undercut meets the needs of the modern finishing department for high production, accurate trimming and safe operation.

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Investigate the new Model "E" for your peacetime needs. Bulletin giving full particulars mailed on request.

THE SMITH & WINCHESTER
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Serving the Paper Industry Since 1828

IMPORTS

NEW YORK IMPORTS

WEEK ENDING FEBRUARY 10, 1948

SUMMARY

Newsprint .....2205 rolls, 68 pkgs.
Printing Paper .... 70 cs., 277 rolls
Wrapping Paper .....564 rolls
Wallpaper ..... 26 pkgs.
Gummed Paper .....94 cs.
Tissue Paper .....17 cs.
Wood Veneer Paper ..... 1 cs.
Copying Paper .....107 cs.
Writing Paper .....2 cs.
Filter Paper .....36 cs.
Photo Paper .....161 cs.
Parchment Paper .....3 cs.
Boxboards ..... 94 rolls
Miscellaneous Paper .....
.....90 cs., 13 bls., 503 rolls

NEWSPRINT

The Rossard Co., Westerdam, Rotterdam, 222 rolls.
Pagel Horton & Co., Inc., Frierfjord, Oslo, 561 rolls.
Madden Reeve Angel & Co., Mormacelm, Hango, 68 pkgs., 1422 rolls.

PRINTING PAPER

F. C. Strype, Veendam, Rotterdam, 10 cs. (uncoated).
Jay Madden Corp., Mormacelm, Hango, 277 rolls.
Stevens Nelson Paper Corp., American Ranger, Havre, 18 cs.
Olympic Shipping Co., American Ranger, Havre, 42 cs.

WRAPPING PAPER

Jay Madden Corp., Mormacelm, Hango, 564 rolls.

WALLPAPER

G. L. Fisher, Union Victory, Antwerp, 26 pkgs. (hand painted).

GUMMED PAPER

B. F. Drakenfeld & Co., American Importer, Liverpool, 94 cs.

TISSUE PAPER

B. F. Drakenfeld & Co., American Importer, Liverpool, 17 cs. (gauze carbonizing).

WOOD VENEER PAPER

Stevens Nelson Paper Co., Whirlwind, Kobe, 1 cs.

COPYING PAPER

Stevens Nelson Paper Corp., Whirlwind, Kobe, 107 cs. (for insulation).

WRITING PAPER

F. L. Kramer & Co., Franklin P. Mall, London, 2 cs.

FILTER PAPER

H. Reeve Angel & Co., Inc., Port Chalmers, London, 36 cs.

PHOTO PAPER

Medo Photo Supply Co., Franklin P. Mall, London, 5 cs.
Lep Transport, Inc., Franklin P. Mall, London, 152 cs. (base board).
J. J. Gavin Co., Port Chalmers, London, 4 cs. (unsensitized).

PARCHMENT PAPER

G. Lippelgoes, Creighton Victory, Antwerp, 2 cs.
Meadows Wye & Co., Queen Mary, Southampton, 1 cs.

BOXBOARDS

National City Bank, Mormacelm, Hango, 71 rolls.
Jay Madden Corp., Mormacelm, Hango, 23 rolls.

MISCELLANEOUS PAPER

Aurore Trading Co., Allegheny Victory, Khoramshahr, 90 cs.
F. C. Strype, Westerdam, Rotterdam, 13 bls.
New York Trust Co., American Ranger, Havre, 503 rolls.

RAGS, BAGGINGS, ETC.

Chase National Bank, American Importer, Manchester, 6 bls. wool rags.
J. Eisenberg, American Importer, Liverpool, 24 bls. wool rags.
C. Comiter, Lookout, Shanghai, 200 bls. cotton waste pickers.
American Cotton Products Co., Lookout, Shanghai, 200 bls. cotton waste.
(———), Veendam, Rotterdam, 81 bls. old cotton rags.
Amtorg Trading Corp., Marshal Govorov, Leningrad, 486 bls. flax waste, 52 bls. new linen cuttings, 30 bls. cotton cuttings.
National City Bank, Warwick Victory, Antwerp, 80 bls. old scrap bagging.
Irving Trust Co., Augustana Victory, Antwerp, 53 bls. tare scrap.

OLD ROPE

Amtorg Trading Corp., Marshal Govorov, Leningrad, 16 bls.

WOODPULP BOARDS

Jay Madden Corp., Mormacelm, Hango, 28 bls., 478 rolls.

GLUESTOCK, ETC.

John Gorvers, Cape Chalmers, Havana, 76 bls. gluestock, 38 bls. hidecuttings.
Transatlantic Animal By-Products, Inc., Augustana Victory, Antwerp, 18 bls. gluestock.
Transatlantic Animal By-Products, Inc., Mormacoak, Rio Grande, 800 bags boneglue.

BOSTON IMPORTS

WEEK ENDING FEBRUARY 7, 1948

S. H. Waldestein, Lookout, Shanghai, 100 bls. cotton waste.

PHILADELPHIA IMPORTS

WEEK ENDING FEBRUARY 7, 1948

Pulp Sales Corp., Mormacelm, Hango, 3282 bls. white moist mechanically ground woodpulp.

BALTIMORE IMPORTS

WEEK ENDING FEBRUARY 7, 1948

Madden Reeve Angel & Co., Mormacelm, Hango, 766 rolls newsprint.
Burnet Foreign Trade Corp., Lookout, Shanghai, 200 bls. cotton waste.

Exports Slumped In November

WASHINGTON — Exports of paper manufactures dropped in November to $11,800,000 from the October level of $13,300,000, the Department of Commerce reported, sharing in the general downward movement of all U. S. shipments abroad outside of food and relief goods.

This country shipped woodpulp amounting to 10,334 short tons, valued at $1,600,000, compared with 16,090 short tons, of $2,500,000 value in October.

Paper and paper manufactured products exported in November amounted to $11,800,000, compared with $13,300,000 in October.

On the import side, the United States received 188,000 tons in November, compared with 200,000 in October, valued respectively at $22,600,000 and $23,300,000; imports of jute and jute butts amounting to 1,510 tons, valued at $400,000 in November, compared with 5,456 tons in October, valued at $1,500,000, among others.

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Cigarette | Wax | Photographic | Jet Propulsion
Condenser | Grease Proof | Snap-out Forms | Aero-engine Parts

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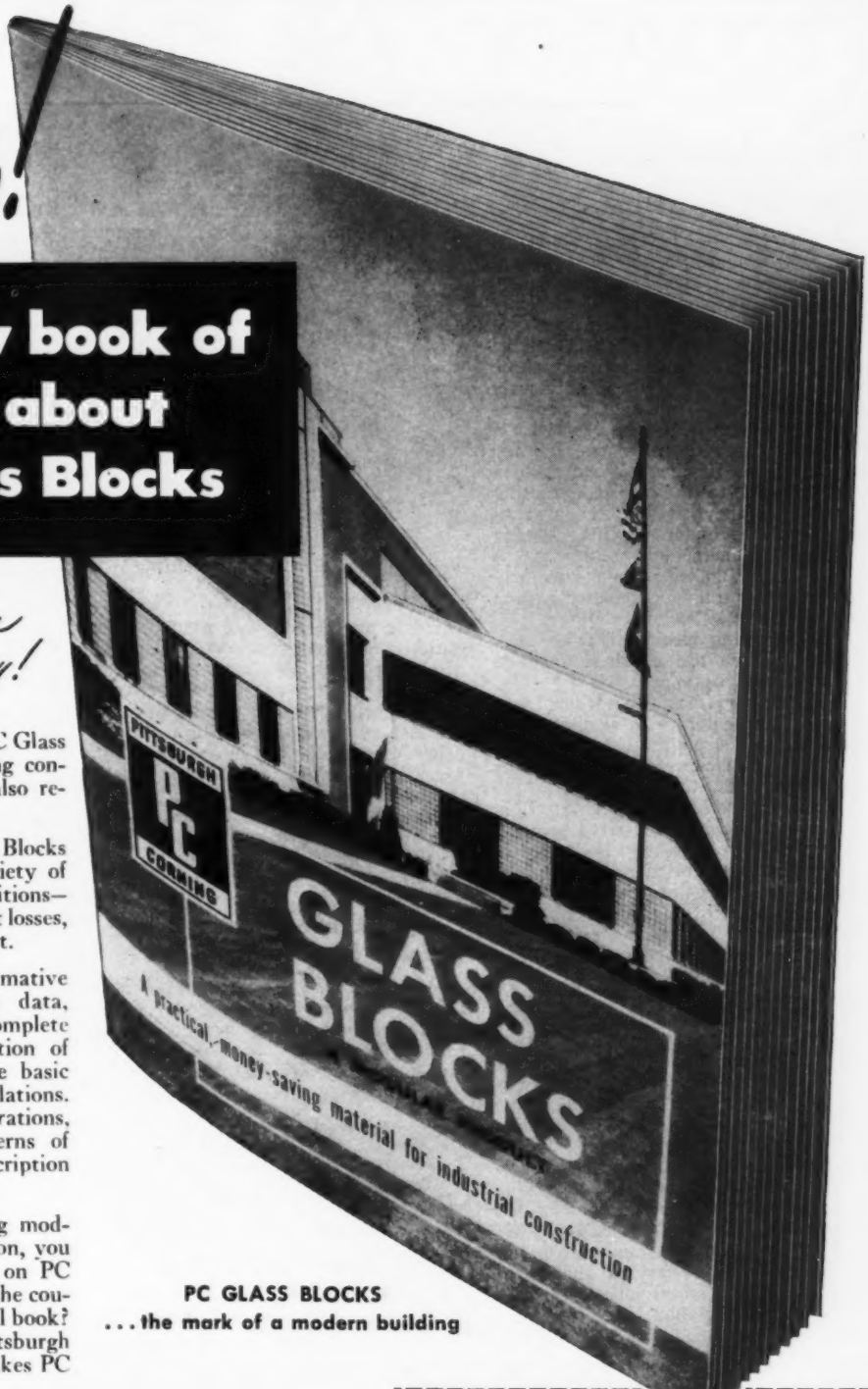
IT TELLS you how panels of PC Glass Blocks can improve operating conditions in your plant—and also reduce operating costs.

IT SHOWS you how PC Glass Blocks are now used in a wide variety of buildings—for walls and partitions—to distribute light, reduce heat losses, exclude harmful dust and grit.

IT GIVES you 32 pages of informative text, complete engineering data, charts, specifications and complete information on the application of modular coordination to the basic principles of glass block installations. It also contains many illustrations, including the various patterns of PC Glass Blocks and a description of their individual functions.

Whether you are planning modernization or new construction, you need the latest information on PC Glass Blocks. Why not send the coupon today and get this helpful book? Remember, it's free. Pittsburgh Corning Corporation also makes PC Foamglas Insulation.



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... the mark of a modern building

PITTSBURGH PC CORNING GLASS BLOCKS

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Please send along my free copy of your new book on the use of PC Glass Blocks for Industrial Buildings. It is understood that I incur no obligation.

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EQUIPMENT AND SUPPLY NEWS

Geigy Introduces Concentrated Inks

NEW YORK — The Geigy Company, Inc., has produced a new development in aniline inks. These new inks, called Graphitone Concentrated Colors, have been made by a new method of manufacture which permits them to be shipped in concentrations two to three times the strength of those previously on the market. This high concentration of color provides the user with a flexible method of using one ink for various types of paper. When thinned with alcohol to the desired printing consistency they show excellent running qualities under varying climatic conditions. Their high color strength and brillancy makes them particularly adaptable for toning pigmented aniline inks.

The following specifications are suggested for the use of these inks on various types of paper:

Sulphite, kraft and absorbent type papers: Thin colors with alcohol to desired printing strength. For opaque effects, add sufficient opaque white or colors for desired results.

Glassine and Pt cellophane: Thin colors with alcohol to desired printing strength. If greater body is desired in ink, particularly for mono-roll type of presses, use 5-point cut wax free shellac in place of part of alcohol used for thinning. For opaque effects, use procedure as noted above.

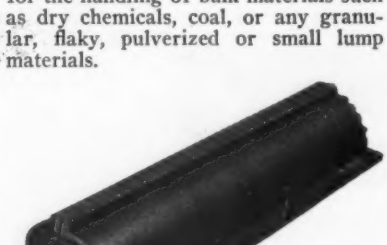
Moisture-proof cellophane—dry wax papers—diaphane: Thin colors using 1 part color, 2 parts shellac wax free 5-point cut, 1 part alcohol. Small amounts of ethylene dichloride may be added to ink to increase receptibility to sheet. On moisture-proof cellophane and diaphane, heat should be applied to web after printing to seal ink into coating. Infra red lamps are recommended for this procedure. For opaque effects, follow procedure as noted above.

Graphitone Concentrated colors can be formulated in various shades to meet customer's requirements. On special shades, a 5 gallon lot is the minimum amount which can be made.

Stephen-Adamson Markets Zipper Conveyor-Elevator

AURORA, Ill. — Test installations in typical industries on Stephen-Adamson Manufacturing Company's new zipper-enclosed-belt type of conveyor-elevator have proven successful, and the zipper has been released to general production.

Described as a remarkable new development in the material handling field which permits the conveying and elevating of bulk materials in any plane and in any direction, it is said to open up a world of new possibilities for the handling of bulk materials such as dry chemicals, coal, or any granular, flaky, pulverized or small lump materials.

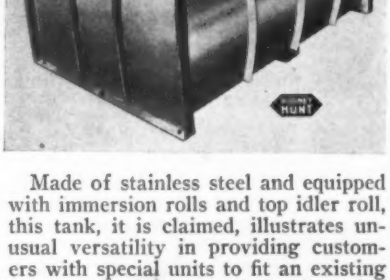


Section through Zipper Belt

The material is conveyed and elevated in any direction in a solid mass entirely enclosed within the belt. At discharge point, the belt is automatically opened for complete discharge and the belt opened to permit cleaning the last vestiges of material from the belt. Test installations in operation for several years show that the zipper belt, manufactured for Stephen-Adamson by the B. F. Goodrich Company, will convey over long distances, to considerable heights, without spillage, breakage or contamination of the product.

Design "Curve-of-Strength" Stainless Steel Tanks

ORANGE, Mass. — The Textile Machinery Division of the Rodney Hunt Machine Company of Orange, Mass., has engineered a "Curve-of-Strength" tank to fill an individual need in a customer's plant.



Made of stainless steel and equipped with immersion rolls and top idler roll, this tank, it is claimed, illustrates unusual versatility in providing customers with special units to fit an existing process. It also is stated that by using their patented "Curve-of-Strength" construction it is often possible to provide stainless steel equipment at a price comparable to that of wood or iron or at a lower figure.

New Portable F. P. Flowrator Kit Ready

HATBORO, Pa.—A new laboratory kit (rotameter type) designed to fill the need for a versatile and inexpensive flow measurement set which will meet the varied flow measurement requirements of the research laboratory is in production at Fischer & Porter Co.

The kit consists of three instruments with metering tubes matched so that the greatest capacity of the smallest tube equals the smallest capacity of the next size. The same relationship exists between the medium size tube and the largest. The range is further increased by equipping each meter with with two floats, one heavy and one light. Capacities from 0.065 to 2200 cc/mm of water and 5.0 to 36,800 cc/min. of air are covered. Provided also is a unique metering tube holder with base plate and hose connectors.

Descriptive bulletin available through Dept. 4 F-J, Fischer & Porter Co., Hatboro, Pa.

General Dyestuff Publicizes Paper Red APX

NEW YORK — Recommending Paper Red APX as an acid dyestuff well suited for the production of evenly-colored bright shades of paper for application in high-speed mills comes General Dyestuff Corporation's Bulletin G-506. Bond, ledger, index and similar grades of paper which require excellent fastness to light are improved by the use of this product, and the dyestuff may be added dry or dissolved prior to addition to the beater. Bulletin available upon request to New York office, 435 Hudson St., New York 14.

Flambeau Installs New Size Press

(Continued from page 16)

The steam condensate from one dryer is measured, and the variation in quantity of water actuates the steam valve which controls the steam flow for the rest of the dryer section. Both the dryer sections before and after the size press have separate Stamm steam controllers which can be interlocked and operated as one when the machine is operated without the size press.

The old Corliss Steam engine drive is replaced with a single unit General Electric D.C. motor whose V belt drives the paper machine. The operating speed can be changed over the range of 150 to 700 feet per minute by a simple twist of the operator's wrist at the control panel. The speed is held constant with less than ½ of 1 percent variation even though the power required by the machine may change as much as 20 percent, and starting and stopping are especially smooth with this equipment. The drive consists of a motor-generator set, a D.C. lineshaft motor and an electronically controlled amplidine speed control system. A 300 H.P. synchronous motor drives the 200 K.W., 250 Volt, D.C. generator and a 7.5 K.W. exciter which converts the power from alternating to direct current for the 250 H.P. D.C. lineshaft motor. The speed is controlled by an electronic amplifier which compares the output voltage of the pilot generator on the line shaft motor with the speed reference voltage, the difference, if any, is applied to the amplidine exciter field in the proper direction to provide the correct excitation voltage and current to the main generator field, to hold the speed of the lineshaft motor constant.

TAPPI Awards Medal To Dr. Emil Heuser

(Continued from page 7)

In 1923 he terminated his activities at Darmstadt and became research director for Vereinigte Glanzstoff A/G, makers of rayon near Berlin. In 1926 he left Germany and established a research department for the Canadian International Paper Company at Hawkesbury, Ontario, which he directed until 1938. While at Hawkesbury he helped to develop the Thorne multistage system of bleaching woodpulp. In March 1938 he joined the Institute of Paper Chemistry staff at Appleton, Wis. While at the Institute his book on "The Chemistry of Cellulose" was published by John Wiley & Sons, Inc.

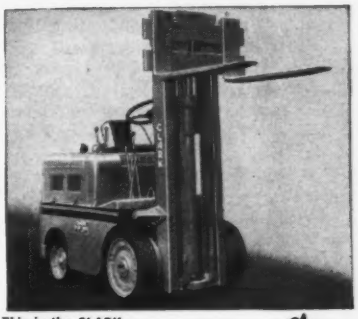
At the end of 1947 he retired from the Institute and is now living in southern California. Since Dr. Heuser will be unable to attend the annual meeting of the Technical Association the medal presentation will be postponed until it is convenient for him to receive it on behalf of the Association at a West Coast point.

MATERIAL HANDLING *News*

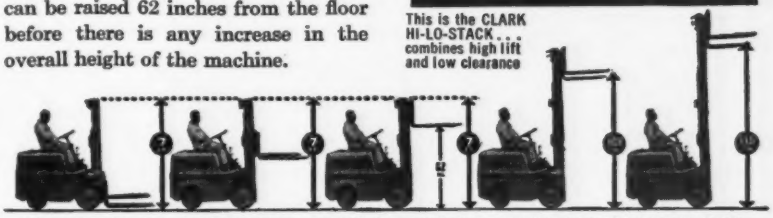
With this high-lift, low-clearance attachment, a Clark fork truck can take material through a freight car door and tier loads to the car roof, as well as tier loads rafter-high in the warehouse.

TIERING HEIGHT 130"
COLLAPSED HEIGHT 83"
FREE LIFT 62"

That "free lift 62 inches" is the vital specification of HI-LO-STACK, Clark's new high-lift, low-clearance attachment. It means that the forks can be raised 62 inches from the floor before there is any increase in the overall height of the machine.



This is the CLARK HI-LO-STACK . . . combines high lift and low clearance



83 INCHES OVERALL HEIGHT, FORKS LOWERED | NO CHANGE IN OVERALL HEIGHT WITH "FREE-LIFT" OF FORKS UP TO 62 INCHES | UP-UP-TO 130 INCHES—22 INCHES ADDITIONAL LIFT FOR EXTRA HIGH TIERING

You recognize instantly the practical benefits of the HI-LO-STACK—it enables a fork truck to take a load through the 7-foot door of a box-car and tier loads to the roof of the car, or to tier unit loads to the rafters in the warehouse. Heretofore, with conventional lift mechanisms, the increasing height of the vehicle made it impossible for the same machine to perform all these operations; making it necessary, in many handling operations, to use two machines—one for loading and unloading cars and another for high tiering in the warehouse.

Also HI-LO-STACK is an exceedingly simple mechanism. It has only one lift cylinder, and a single set of uprights with slide members inside. Lifting is accomplished with unusually low hydraulic pressure, which minimizes possibility of leakage.

It adds up that HI-LO-STACK is a typical Clark development—sturdily built, simple as can be, a thoroughly dependable unit; a good example of the sound engineering and incomparably rich knowledge of handling operations for which Industry looks to Clark. Write for particulars.

CLARK GAS AND ELECTRIC POWERED FORK TRUCKS
AND INDUSTRIAL TOWING TRACTORS

CLARK EQUIPMENT COMPANY, TRUCTRACTOR DIVISION, BATTLE CREEK 58, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

TRENDS

Office of the PAPER TRADE JOURNAL,
Wednesday, February 11, 1948.

Canada's Import Restrictions are amended as follows:

Tarred paper and prepared roofings (including shingles), sheathing, insulation (not including fibreglass), building board, chipboard, newsboard, strawboard, testboard, corrugated board and all other similar boards manufactured wholly or in part of vegetable fibres (not including electric insulation board, shoe board, automobile board, bookbinders' board and pressboard); Bristol board, artists' board, photograph mounting board, picture matting board and show-card board; flock coated board or paper; wax coated paper; blotting paper not printed.

Towels, napkins, table covers, tray covers and doilies, of paper; fancy shelf and lace papers; paper handkerchiefs; facial tissues and toilet paper, including such materials in jumbo rolls; cups, dishes or plates, forks, spoons, and drinking straws, made of paper, cardboard, or of vegetable fibres; paper envelopes; correspondence and printed letterhead papers, not including plain unprinted typewriter or copying papers; creped tissue paper and manufacture thereof; wrapping paper (including box covering paper and wrappers) printed, embossed or othewise decorated; Christmas seals, stickers, tags and enclosure cards, printed, embossed or otherwise decorated; card and other games, score reckoners, score pads, tallies and place cards, of paper or cardboard, including costumes, hats, caps, headbands, masks, horns, serpentines and confetti; gummed paper, blank books; photograph mounts manufactured from paper or paper board.

Containers wholly or partially manufactured from fibreboard or paperboard have been deleted.

* * *

It is reported that the Canadian Paper Box Manufacturers Association has asked its government to explain the lifting of the restrictions on the importation of paperboard containers while continuing the ban on box wraps, their contention being that such an action places the setup box manufacturers at disadvantage since they are able to meet all requirements for both folding and setup paper boxes.

Meeting in New York for their fifteenth annual convention, the National Burlap Bag Dealers Association reiterated the concern spoken by the Jute industry's convention that the multi-wall paper bag will continue to make inroads as a substitute for textile bags and reduce that business to insignificance. One example cited is of a mill which used 30,000 bags a month for scratch feed and was switched to paper bags by a mistake in filling the order. Customer's sales resistance to burlap is reported as insurmountable, and the trend to paper bags is called a menace which must be met by keeping prices of textile bags down.

Market information sources are speculating on improved supplies of kraft wrapping within the next few months, although still much short of demand; that decorative papers, set-up and folding boxes and liquid-tight paper containers will be in plentiful supply, also that tissues will continue tight.

Fifty-four of the 423 rolls of French newsprint bought by a Flint newspaper were used for the sixty-page Sunday paper, it is reported, also that because of the shorter rolls and prohibitive cost, there will be no repurchase.

A newsprint mill is being established near Burhanpur in the Central Provinces, India, daily production goal to start at one hundred tons.

Woodpulp

In addition to the 8,500 long tons of woodpulp reported as unloading at Norfolk from the S. S. Britta on February 9, the Swedish freighter Sparreholm docked at Philadelphia with 21,948 bales, and the Danaholm with 9,165 bales, plus 406 rolls of newsprint.

With the supply of pulp further restricted by frozen water supply, tonnages of market pulp were limited with little prospect of meeting the strong demand. Unbleached kraft's temporary softening is an exception, and demand and supply were reported in better balance on a quieter market. Prices however are steady. Supplies of mechanical woodpulp are much below requirements for those relying on market pulp.

Latest information on Swedish export prices of pulp is that they are expected to be free of government "directives" at the expiration of the agreement between the Swedish pulp industry and the authorities on January 31, 1948.

Reporting on the trade agreement recently made between Sweden and Britain for 1948. *Svensk Pappersmasse-Tiding* says that deliveries of mechanical and chemical pulp will about correspond to the magnitude of 1947 export, i.e., 150,00 tons of mechanical and 250,000 tons of chemical.

Waste Paper

Continued lack of folder news and old corrugated and a strong demand for quantities beyond available supply served to strengthen prices, even though the mills demonstrated unwillingless to recognize the firming situation. Folded news in New York and Chicago is reported steadily advancing, while in New England the market held the prices of the previous week as consumer demand seemed less pressing. Dealers in New York are reported paying $21 and $22 a ton for folded news and finding supplies difficult to obtain at these prices.

Sharp demand and scarce supply for old corrugated pushed up prices two dollars more a ton, and dealers report having to pay $28 and $29 f.o.b. cars. Chicago market advanced sharply $5 a ton, while Boston remained at $24 and $25 with a few sales reported at $26 and $28 per ton.

Mixed is somewhat easier with prices firm. Supply is keeping abreast the demand on this variety. New York market is reported stronger than Chicago and Boston, although both New York and Chicago upped prices $2 a ton.

High grades are scarce and tight. Old kraft reflects the softened condition of the kraft pulp market and is somewhat weaker.

Cottons

Declines in the commodity market and anticipated heavy supplies of new cuttings soon to be released by manufacturers have produced cautious buying in new cottons, and purchasing is against present needs only. Prices are reported unchanged however.

Old cottons remain strong as supplies continue in short supply and demand fairly strong. Roofing rags are reported in particularly good demand, especially in Boston where $40 for No. 2 plus $2 transportation allowance was paid.

Increasing quantities of foreign rags are making their appearance and consumer interest is noted.

Index

Index of general business activity for the week ended January 31 receded to 151.3 from 156.1 in the preceding week, compared with 147.6 for the corresponding week of 1947. The index of paperboard production dropped to 183.2 from 190.5 in the preceding week, compared with 176.7 in the corresponding week of 1947.

Paper production for the week ended January 31 was estimated at 103.6 percent, compared with 101.1 (revised figure) for the previous week, with 104.0 for the corresponding week of 1947, with 101.5 for 1946, and with 88.1 for the corresponding week of 1945. (This does not include mills producing newsprint exclusively).

Paperboard production for the week ended January 31 was 103.0 percent of capacity, compared with 104.0 for the previous week, with 102.0 for the corresponding week of 1947, with 95.0 for 1946, and with 92.0 for the corresponding week of 1945.

PENNSALT
Liquid Chlorine

for the Paper Industry

Ever since 1909, when the first tank car load of Liquid Chlorine moved out of Pennsalt's Michigan plant, Pennsalt Liquid Chlorine has played an important role in American paper production.

Today, paper mills look to Pennsalt, not only for chlorine, but for many other key chemicals for paper production . . . Bleaching Powder, Corrosion-Resistant Cements, Anhydrous Ammonia, Alum, Acids, Per*chlor*on*, Potassium Chlorate, Sodium Hypochlorite.

*REG. U. S. PAT. OFF.

PENNSYLVANIA SALT MANUFACTURING COMPANY
1000 Widener Building, Philadelphia 7, Pa.

PENN SALT
CHEMICALS

PRICES

With the elimination of price controls on paper, pulp, ags and other materials, the quotations given below once nore become indicative of trends in an open market. At he moment they can be of little more, for, while some vol-me business still is being done under contract at the gures given below, fluctuations representing special con-itions are too varied and too frequent to permit prices o be given as representing a wholly stabilized market.

Paper

(Delivered New York)

tandard News, per ton—

Rolls, contract ...	$91.00 to		$96.00
Sheets	102.50 "		109.00

raft—per cwt.—Carload Quantities
Zone A Deld. 40 lb. base wgt.

Superstandard Wrapping	$9.00	to	—
No. 1 Wrapping..	7.25	"	8.00
Standard Wrapping	6.50	"	—
Standard Bag	6.50	"	—

Issues—Per Ream 24x36 (480) 11 . Zone 1.

Wh. No. 1 Frd. ..	$1.84	to	$2.00
Wh. No. 1 M. G.	1.94	"	2.00
Wh. No. 1½.....	1.60	"	—
Wh. No. 2	1.75	"	—
Kraft Anti-Tar ..	1.65	"	—
Kraft Unbl. ..	1.85	"	—
Manila No. 2 ..	1.62	"	—
Shred. Wh. No. 1 cwt.	1.10	"	1.50

ollet—Per Case of 100 rolls—1 M heets.

Unbleached	$8.50	to	$10.00
Bleached	8.50	"	10.00

aper Towels—Per Case of 3750—ne 1.

Wh. Jr. M'tif'd 9¼x9½			$5.15
Br. Sr. M'tif'd 10x12			3.60
Br. Jr. M'tif'd 9½x9¾.....			3.10
Br. Jr. Sgl. fold 10 x10¾ ..			3.15

Manila—per cwt.—C-l. f.a.

No. 1 Jute Tag ..$14.50		to	—
Reg. Jute Manila 13.25		"	$15.50
No. 1 Manila	9.75	"	—

oards, per ton—

Plain News	$92.50	"	—
Filled News	94.00	"	—
Plain Chip	90.00	"	—
Sgl. Mla. J-d. Chip* 100.00		"	102.50
White Pat. Coated*120.00		"	—
Kraft Liners 42 lb. 100.00		"	—
Kraft Corr. .009 105.00		"	—
Binders Boards ..126.00		"	—

* Base Prices per 10 tons. Less han 10 tons but over 3 tons, add 2.50; three tons or less, add $5; regu-r 35-39 basis, add $5; basis 40-49, ld $2.50; basis 91-100, add $2.50; asis 101-120, add $5.

The following prices are representa-ve of distributors' resale prices, all eliveries in Zone 1: Rag Content onds and Ledgers—

White, Assorted Items
Bonds, per cwt.

	Carton	4 C't'n	Ton
00% Rag Ext. No. 1	$55.00	$50.80	$48.70
00% Rag	48.25	44.55	42.70
5% Rag	37.50	34.55	33.10
0% Rag	32.25	29.40	28.25
5% Rag	28.75	26.15	25.10

Ledgers, per cwt.

00% Rag Ext. No. 1	$55.00	$50.80	$48.70
00% Rag	48.25	44.55	42.70
5% Rag	37.50	34.55	33.10
0% Rag	32.25	29.40	28.25
5% Rag	28.75	26.15	25.10

Sulphite Bonds and Ledgers—
White, Assorted Items
Bonds, per cwt.

No. 1	$21.25	$19.25	$18.50
No. 2	20.25	18.30	17.55
No. 4	19.25	17.55	16.85

Ledgers, per cwt.

No. 1	$21.75	$19.65	$18.85
No. 2	20.75	18.75	18.05
No. 4	20.00	18.10	17.35

Free Sheet Book Papers—
White, Cased Paper

(Per cwt.)	Case	Ton
No. 1 Glossy Coated ...	$20.40	$19.50
No. 2 Glossy Coated....	19.15	18.30
No. 3 Glossy Coated....	18.40	17.60

(Per cwt.)	Case	Ton
No. 1 Antique (Watermarked)	$15.90	$15.15
No. 2 Offset	15.15 to 17.90	14.60 to 17.10
A Grade E. F.	14.90	14.25
A Grade S. & S. C. ...	15.40	14.65
B Grade E. F.	13.90	13.30
B Grade S. C.	14.40	13.70

Wood Pulp

Domestic mill contract prices delivered with varying freight allowances.

	Per Short ton	ADT
Groundwood	$80.00 to	$81.00
Unbleached Sulphite..	124.00 "	—
Bleached Sulphite ...	125.00 "	135.00
Bleached Soda	130.00 "	—
Bleached Sulphate ..	175.00 "	185.00
Unbleached Sulphate Northern	125.00 "	155.00
Unbleached Sulphate Southern	130.00 "	145.00

Canadian Quotations

Prices delivered with varying freight allowances unless otherwise specified:

	Per Short ton	ADT
Reg. No. 1 Kraft	125.00 "	—
Unbleached Sulphite.	125.00 "	126.00
Bleached Sulphite ...	125.00 "	135.00
Glassine Unbleached Sulphite (no freight allowance)	120.00 "	—
Bleached Soda	130.00 "	—
Groundwood	80.00 "	85.00
Sideruns Pulping News	80.00 "	—
Hardwood and Specialty Grades	Nominal	

Swedish Quotations

On dock, Atlantic Ports

	Per Short ton	ADT
Bleached Kraft	175.00 "	185.00
Bleached Sulphite ..	175.00 "	185.00
Unbleached Sulphite..	145.00 "	175.00
Unbleached Kraft....	140.00 "	165.00

Finnish Quotations

On dock, Atlantic Ports

	Per Short ton	ADT
Bleached Sulphite ..	$185.00 to	—
Unbleached Sulphite	155.00 "	157.00
Unbleached Sulphate	147.50 "	—

New Domestic Cotton Cuttings

(F.O.B. Shipping Point Plus Dealer's Commission)

White Shirt	$12.00 to	—
Light Silesias	9.00 "	—
Unbleached Muslin ..	12.00 "	—
White Back Blue Overalls	9.00 "	9.25
Blue Overalls	8.00 "	—
Fancy Shirt	6.00 "	—
Light Percales	8.50 "	—
Light Prints	7.50 "	—
No. 1 Washables	5.00 "	—
Bleachable Khaki	7.00 "	7.50
Unbleachable Khaki ..	6.00 "	6.50
Cottonades	5.50 "	5.75

Old Domestic Cotton Rags

(F.O.B. Shipping Point Plus Dealer's Commission)

	Per 100 lbs.	
No. 1 Whites Repacked	$5.00 to	—
No. 1 Whites Miscellaneous	4.00 "	—
No. 2 Whites Repacked	3.50 "	3.75
No. 2 Whites Miscellaneous	3.00 "	—
Blue Overalls	3.75 "	—
Thirds and Blues Repacked	3.25 "	—
No. 1 Roofing Rags ..	1.90 "	—
No. 2 Roofing Rags ..	1.75 "	—
No. 3 Jute Bagging .	1.60 "	—
No. 4 Brussels and hard back carpets ..	1.60 "	—
No. 5A Roofing Rags .	1.80 "	—

New Foreign Cotton Cuttings

(Prices to Mill, F.O.B. Dock, N. Y.)

	Per 100 lbs.	
New Dark Cuttings ..	$5.50 to	$5.75
New Mixed Cuttings .	6.25 "	6.50
Light Silesias	9.25 "	9.50
Light Flannelettes ..	9.25 "	9.50
New White Cuttings .	12.00 "	—
New Unbleached Cuttings	12.25 "	—
Fancy Shirt Cuttings.	6.50 "	7.00
Light Prints	7.75 "	8.00
Bleachable Khaki, No. 1	7.00 "	7.50
Unbl. Khaki, No. 1 ..	6.25 "	6.75

Old Foreign Rags

(Prices to Mill, f.o.b. dock, N.Y.)

	Per 100 lbs.	
No. 1 White Linens...	$14.00 to	16.00
No. 2 White Linens...	12.00 "	13.00
No. 3 White Linens...	8.00 "	9.00
No. 4 White Linens...	8.00 "	9.00
No. 1 White Cottons...	8.00 "	10.00
No. 2 White Cottons...	7.00 "	8.00
No. 3 White Cottons...	6.00 "	6.50
No. 4 White Cottons...	4.00 "	4.50
Extra Light Prints....	7.50 "	8.00
No. 1 New Light Prints	6.25 "	6.75
Med. Light Prints.....	5.25 "	5.75
Dutch Blue Cottons....	5.25 "	5.50
Checks and Blues.....	4.00 "	4.25
Linsey Garments	3.00 "	3.75
Dark Cottons, European	2.20 "	2.60
Dark Cottons, Egyptian	1.75 "	2.00
Old Shopperies	2.50 "	3.00
New Shopperies	2.50 "	3.00

Bagging

(Prices to Mill, f.o.b. N. Y.)

	Per 100 lbs.	
Foreign Gunny, No. 1..	$5.75 to	$6.00
Domestic Gunny, No. 1	6.25 "	6.50
Light Wool Tares	6.00 "	6.25
Heavy Wool Tares	6.00 "	6.25
No. 1 Scrap Bagging ..	6.00 "	6.25
Foreign Manila Rope ..	6.00 "	6.75
Domestic Manila Rope	5.75 "	6.50
Jute Strings	5.00 "	5.25
No. 1 Sisal Strings ...	5.25 "	5.50
Mixed Strings	1.75 "	2.50
Mixed Strings, Outthrows	.90 "	1.10

Waste Paper

Base Prices to Mills for Average Packings

(Dollars Per Ton)
F.o.b. New York, Baled

No. 1 Hard White Envelope Cuts, one cut	155.00 to 165.00
No. 1 Hard White Envelope Cuts	145.00 " 155.00
No. 1 Hard White Shavings, unruled.	145.00 " 155.00
No. 1 Hard White Shavings, ruled ..	110.00 " 130.00
Soft White Shavings, one cut	145.00 " 155.00
No. 1 Soft White Shavings	135.00 " 145.00
Soft White Shavings, Misc.	125.00 " 135.00
No. 1 Fly Leaf Shavings	45.00 " —
No. 1 Groundwood Fly Leaf Shaving	35.00 " —
No. 1 Heavy Books & Magazines	27.00 " —
Mixed Books	15.00 " 20.00
No. 1 White Ledger	85.00 " 90.00
New Manila Envelope Cuttings, one cut..	100.00 " 110.00
New Manila Envelope Cuttings	65.00 " 75.00
Extra Manilas	25.00 " 30.00
Mixed Kraft, Env. & Bag Cuttings	75.00 " 85.00
Kraft Envelope Cuttings	110.00 " —
Triple Sorted, No. 1 Brown Soft Kraft.	65.00 " 75.00
New Kraft Corrugated Cuttings	85.00 " 90.00
No. 1 Assorted Old Kraft	55.00 " 60.00
New Jute Corrugated Cuttings	27.00 " —
Old 100% Kraft Corrugated Containers	45.00 " 50.00
No. 1 News	18.00 " 20.00
No. 1 Mixed Paper ..	13.00 " 14.00
Box Board Cuttings..	— " —
White Blank News...	75.00 " 85.00
Overissue News	19.00 " 21.00
Old Corrugated	26.00 " 28.00
Mill Wrappers	22.00 " 25.00

Twines

All Prices Nominal, F.o.b. Mill

(Soft Fiber)

Coarse Polished— India	.33¼	to	.35
Fine India	.38¾	"	.42½
Fine Polished—			
Unpolished— Paper Makers	.28¼	"	.30½
Tube Rope	.29	"	.31½
Wrapping	.32	"	.35¼
Cotton	.63¼	"	.66¾

(Hard Fiber)

Mex. Sisal	.21	"	.27
Manila (Reprocessed)	.30	"	.32

(American Hemp)

Polished Hemp	.36¾	"	.60
Unpolished	.32¼	"	.54

PHILADELPHIA

Domestic Rags (New)

(F.O.B. Eastern Shipping Point)

Shirt Cuttings— New White No. 1..	.11	to	.12
New White No. 2..	nominal		
Light Silesias	.07½	"	.08
Black Silesias, soft	.06½	"	.07
New Unbleached ..	.10½	"	.11¼
Washable Prints ..	.06¾	"	.07
Washable No. 1....	.05	"	.05½
Blue Overall	.07½	"	.08
Cottons—According to grades—			
Washable Shredding	.03½	"	.04
Fancy Percales ...	.06¾	"	.07¼
New Black Soft	nominal		
Khaki Cuttings—			
Unbleachable Cotton Cuttings	.06	"	.06½
Bleachable Cotton Cuttings	.07	"	.07½
Men's Corduroy ..	.05½	"	.06
Ladies' Corduroy ..	.05	"	.05½
Cottonades	.05½	"	.06

Domestic Rags (Old)

(F.O.B. Eastern Shipping Point)

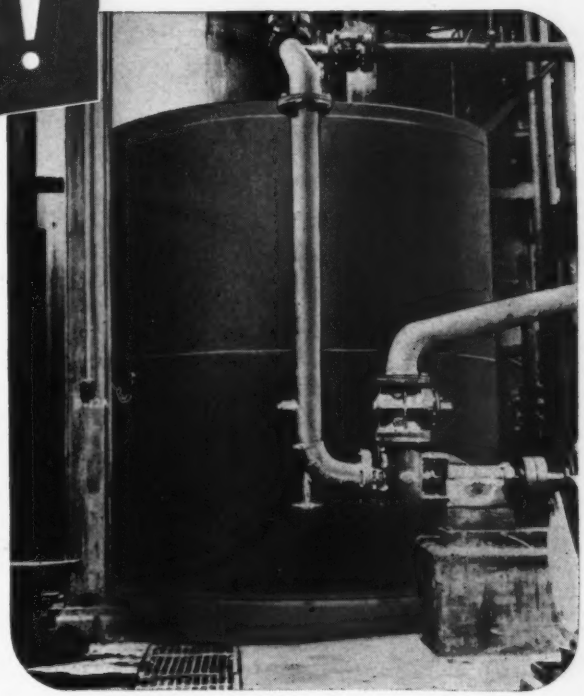
White No. 1—Repacked	4.50	to	5.00
Mixed White	4.00	"	4.25
White No. 2—Repacked	3.50	"	3.75
Thirds and Blues— Miscellaneous	2.25	"	2.50
Repacked	2.75	"	3.00
Roofing Stock— Foreign No. 1.....	nominal		
Domestic No. 1....	1.85	"	1.90
Domestic No. 2....	1.75	"	1.80
Roofing Bagging ..	1.65	"	1.70
Old Manila Rope....	6.25	"	6.50

Bagging

(F.O.B. Eastern Shipping Point)

Gunny No. 1— Foreign	nominal		
Domestic	4.75	to	5.25
No. 1 Clean Bright— Sisal Strings	.04½	"	.05
No. 2 Clean Bright— Sisal Strings	.03½	"	.04
Sisal Jute	.02¾	"	.03
Scrap— No. 1	5.00	"	5.50
No. 2	2.50	"	3.00

Get "solid" metal protection with clad steel economy... the Lukens way!



Processing tank fabricated of Lukens Nickel-Clad Steel by Horton Steel Works, Limited, Fort Erie, Ontario, shown after installation in a paper mill.

Have you considered this?

Where one surface is exposed to corrosive attack, a Lukens Clad Steel will give you the same protection offered by the solid corrosion-resistant metal. Yet the cladding of corrosion-resistant metal comprises only 10 per cent or other small fraction of the total plate thickness, as your service requires.

Lukens Clad Steels include Nickel-Clad, Stainless-Clad, Inconel-Clad and Monel-Clad—the widest range of clad steels available to industry. Backing plates can be any steel of ASME quality.

Manufactured by Lukens method, the bond between cladding and backing plate is permanent, the thickness of cladding uniform. Available in plates up to 178" wide, or from $\frac{3}{16}$" to over 3" thick. Commercial methods of welding, bending, shearing or pressing are employed.

Let our engineers help you gain solid metal corrosion-protection with the economy which clad steels make possible. Complete information on Lukens Stainless-Clad Steels is contained in Bulletin 338; on Nickel-Clad, Inconel-Clad and Monel-Clad in Bulletin 255. Lukens Steel Company, 403 Lukens Building, Coatesville, Penna.

LUKENS

Nickel-Clad Stainless-Clad
Inconel-Clad Monel-Clad
STEELS

★

SOLID METAL ADVANTAGES WITH CLAD STEEL ECONOMY

Wool ..ares, heavy...	4.75	"	5.00
New Burlap Cuttings	6.00	"	6.50

Old Papers

(F. o. b. Phila.)
Mill Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	$100.00	to	$115.00
No. 1 Hard White Shavings, unruled..	100.00	"	—
Soft White Shavings, one cut	90.00	"	95.00
White Blank News..	70.00	"	75.00
Soft White Shavings.	80.00	"	—
No. 1 White Ledger.	85.00	"	90.00
Ledger, Colored	70.00	"	72.00
No. 1 Heavy Books & Magazines	24.00	"	26.00
Overissue Magazines..	nominal		
New Manila Envelope Cuttings	80.00	"	—
No. 1 Assorted Old Kraft	60.00	"	65.00
No. 1 Mixed Paper..	11.00	"	12.00
Box Board Cuttings..	10.00	"	11.00
Kraft Corrugated Cuttings	90.00	"	100.00
Old Corrugated	24.00	"	26.00
Overissue News	20.00	"	22.00
No. 1 News	13.00	"	15.00

BOSTON

Old Papers

(F.o.b. Boston)
Mill Prices, Baled

No. 1 Hard White Shavings, unruled..	6.25	to	6.75
No. 1 Hard White Shavings, ruled	6.00	"	6.50
Soft White Shavings, Misc.	5.25	"	5.50
No. 1 Fly Leaf Shavings	1.75	"	1.85
No. 2 Fly Leaf Shavings	1.65	"	1.75
No. 1 Groundwood Fly Leaf Shavings	1.75	"	2.00
No. 2 Groundwood Fly Leaf Shavings	1.50	"	1.75
Mixed Colored Shavings	2.00	"	2.25
New Manila Envelope Cuts, one cut	4.50	"	4.75
Hard White Envelope Cuts, one cut	6.00	"	6.50
Triple Sorted No. 1 Brown Soft Kraft	3.75	"	4.00
Mixed Kraft Env. & Bag Cuttings	4.00	"	4.25
Kraft Envelope Cuttings	3.75	"	4.00
No. 1 Heavy Books & Magazines	1.25	"	1.75
New Manila Envelope Cuttings, one cut	—	"	—
New Manila Envelope Cuttings	4.00	"	4.25
White and Colored Tabulating Cards	4.00	"	4.50
Groundwood Tabulating Cards	1.50	"	1.75
White Blank News..	2.25	"	2.50
No. 1 Assorted Old Kraft	3.50	"	—
No. 1 Mixed Paper..	.65	"	.75
Overissue News	1.00	"	1.25
Box Board Cuttings..	.60	"	.70
New Corrugated Cuttings, Kraft	2.75	"	3.00
Old Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.25	"	1.30
Jute Corrugated Cuttings	1.07½	"	—
Paper Strings	2.00	"	2.25

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	—	to	4.75
Domestic	—	"	4.75
Sisal Rope No. 1	6.00	"	—
Sisal Rope No. 2	5.50	"	—
Mixed Rope	5.25	"	—
Mixed Strings	2.00	"	2.50
Transmission Rope—			
Foreign	(nominal)		
Domestic	3.00	"	3.50
Manila Rope—			
Foreign	(nominal)		
Domestic	6.25	"	—
Soft Jute Rope	5.00	"	5.25
Jute Carpet Threads.	6.00	"	—
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	—	"	4.75
Domestic	—	"	4.87½
South America	5.25	"	—
Wool Tares—			
Foreign	4.75	"	—
Domestic	4.75	"	—
Aust. Wool Pouches..	5.00	"	5.25
New Zealand Wool Pouches	5.25	"	5.50
New Burlap Cuttings	6.00	"	6.50
Heavy Baling Bagging	5.25	"	5.75
Paper Mill Bagging..	3.50	"	3.75
No. 1 Roofing Bagging	1.75	"	—

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	.08	to	—
Fancy Percales	.07½	"	.08
New White No. 1	.11	"	.11½
New Light Flannelettes	.08	"	.08½
Canton Flannels, Bleached	.10	"	.11
Underwear Cutters, Bleached	.10	"	.11
Underwear Cutters, Unbleached	.11	"	.12
Silesias No. 1	.08	"	.08½
New Black Silesias..	.05	"	—
Red Cotton Cuttings.	.05	"	—
Blue Overalls	.08½	"	.09
Soft Unbleached	.11	"	.12
Blue Cheviots	.08½	"	.09
Fancy	.06	"	—
Washable	.06	"	—
Khaki Cuttings	.06½	"	.07½
Corduroy	.03½	"	—
Khaki Canvas	.06¼	"	.06½
B. V. D. Cuttings	.10½	"	.11½

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.00	to	—
Miscellaneous	3.20	"	—
White No. 2—			
Miscellaneous	2.65	"	—
Twos and Blues, Repacked	3.20	"	—
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—
Miscellaneous	1.80	"	—
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	2.00	"	—
No. 2	1.75	"	2.00
No. 3	1.35	"	—
No. 4	1.35	"	—
No. 5, Quality A	1.35	"	—
Quality B	1.20	"	—
Quality C	.95	"	—
Old Manila Rope	6.00	"	—

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)
Mill Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	$150.00	to	—
No. 1 Hard White Shavings, unruled	140.00	"	—
No. 1 Soft White Shavings	120.00	"	—
No. 1 White Ledger.	95.00	to	—
No. 1 Heavy Books & Magazines	30.00	"	35.00
White Blank News..	80.00	"	85.00
Mixed Kraft Env. & Bag Cuttings	80.00	"	90.00
No. 1 Assorted Old Kraft	35.00	"	—
Overissue News	27.00	"	—
No. 1 News	23.00	"	—
No. 1 Mixed Paper	15.00	"	—
Old Corrugated	25.00	"	—
Mill Wrappers	16.00	"	—

MARKETS

BLANC FIXE—Demand continues strong. Price firm following price rise on by-product. Pulp is currently quoted at $85 in bags, car lots at works, 6 cents per lb., l.c.l., deld.; by-product $75 per ton, car lots at works, 6 cents per lb., l.c.l., deld.

BLEACHING POWDER—Market near a balance. Supply improves. Prices range from $3.75 to $4 per 100 pound drums, l.c.l., works.

CASEIN — Market approximately unchanged. Slight softening on imported product. Domestic production unsettled. Stocks inadequate. Current prices on processed acid precipitated casein at 33 to 35 cents per pound for domestic grades and 29 to 30 cents for imported grades, f.o.b. shipping point.

CAUSTIC SODA—Supply worsened by shortage of box and tank cars which has been aggravated by severe weather. Solid caustic is reported at $2.85 per cwt.; flaked and ground is quoted at $3.25 per cwt. in 400 pound drums, $3.75 per cwt. in 100 pound drums — car lots at works; liquid 50% in tank cars at $2.25 per cwt.; liquid 73% in tank cars at $2.35 per cwt. at works.

CHINA CLAY—Domestic grades in good supply. Filled is $9 to $11.50 per ton, car lots; coating clay is $14 to $22. Imported clay quotation, short tons, $16 to $35, export warehouse. Supply improved.

CHLORINE—Supply condition unimproved. Deliveries restricted by slow rolling of tank cars. Prices unchanged. Currently quoted at $2.25 per cwt. in single unit tank cars, at $2.55 to $3.75 per cwt. multi-unit tank cars, f.o.b. works.

ROSIN — Trading dull. Prices firm. Active foreign inquiry. Gum rosin in drums per 100 pounds net in yard. New York car lots B, D, $9.25; E, F, $10; G, H, I, K, M, N, $10.25; WG, $10.60; WW, $10.70. Wood rosin, per 100 pounds, net, f.o.b., l.c.l., N. Y., B, $6.45; FF, $7.95; G, H, I, $10.37; K, $10.41; M, $10.47; N, $10.64; WG, $10.95; WW, $11.08.

SALT CAKE—Demand continues ahead of supply with slight improvement in shipments. Prices unchanged. Weather hampers shipping. Domestic salt cake is quoted at $20 to $26.

SODA ASH—Demand strong. Market tighter. No box cars available for bulk shipments. Shipments only against contracts. Current prices, car lots, per 100 pounds: in bulk, $1.10; in paper bags, $1.30; and in barrels, $1.70.

SODIUM BICARBONATE—Shortage of box cars delays shipment. Supply approximately abreast the demand. Reported as $1.85 per cwt. paper bags, carload lots.

STARCH — Production improved considerably. Export good. Prices firm. Market easier. Pearl grade quoted at $7.06 per 100 pounds; powdered starch at $7.27 per 100 pounds; car lots, New York.

SULPHATE OF ALUMINA—Prices unchanged. Supply steady. The commercial grades are quoted at from $1.15 to $1.30 per 100 pounds, in bags, car lots, f.o.b. works. Iron free is $2 per 100 pounds in bags, car lots, at works.

SULPHUR—Supplies ample. Prices unchanged. Annual contracts are quoted at $16 to $18 per long ton, f.o.b. mines; the price f.o.b. at Gulf ports is $17.50 to $19.50 per long ton.

TALC—No change in domestic market. Demand far in excess of supply. Domestic grades are currently quoted at $21 per ton in mines; Canadian at $35 and up per ton. All prices in car lots.

TITANIUM DIOXIDE — Demand strong. Extremely tight supply with no early easing seen. Anastase 17½c lb. carload lots, 18-18½c l.c.l.; rutile 19½c lb. carload lots, 20-20½c l.c.l.; 50-lb. bags, f.o.b. plant, minimum freight allowance.

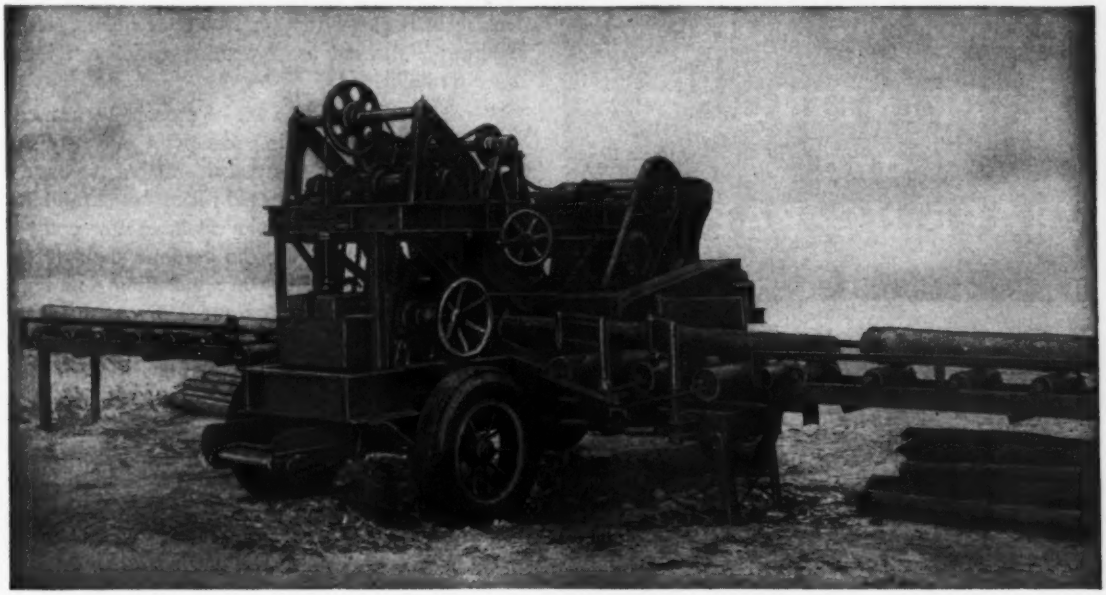
. . . are you concerned with the production

. . of more peeled pulp wood at lower cost?

if so you should investigate the merits of the—

Nekoosa Portable Wood Peeler

it is meeting with wider acceptance daily



THIS is an era of change—along with the "New Look" we have the "New Way"—the Nekoosa Peeler way. The Nekoosa Portable Wood Peeler offers pulpwood producers "the new way" of peeling pulpwood—more efficiently and more economically; effecting savings in wood, labor and freight.

Machine handles practically all species of pulpwood—hard wood exceptionally well.

Ideal for peeling fence posts before preservative treatment.

Write us for particulars.

Nekoosa Foundry & Machine Works Inc.

Nekoosa, Wis.

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Flat Screens	**Agitators**	**Digester Fittings**
Ball Valves	**Deckers**	**Press Marking Equipment**

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ATTENTION
PAPER MILLS

We invite contacts with mills seeking dependable and reliable sales service.

Make Great Atlantic in New York your Eastern Sales Headquarters.

DIGESTED

There are many reasons for the frequency and severity of woods accidents. Some of them are: The nature of the work itself—hard work and heavy labor using sharp pointed and sharp edged tools; varying weather conditions; wide and varied ground area covered by the average job; and floating labor supply with its consequent high labor turnover, making it difficult to train the men. Last, but not least, there is the fact that the development of safety consciousness and safety training programs for the woods have not received as much time and attention as they have in mills and factories. Many companies who scan their factory accident records closely accept woods accidents, with their resulting highcosts, as something which are inevitable and can't be helped.

Woods accidents cost a lot of money. Insurance rates on woods operations bring this point out very sharply. Not only do we have many accidents but we have many serious accidents, fatalities, broken bones and loss of limbs and eyes. Many employers have now come to the conclusion that something can be done about it and are proceeding to do it. They are installing definite, carefully worked out safety programs.—By ALBEN KEENAN, Assistant Superintendent, Hollingsworth & Whitney Co. From an address before the National Safety Council.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1948		Corresponding Weeks—1947	
December 27, '47	74.9	December 28, '46	71.8
January 3	100.3	January 4	96.3
January 10	99.4	January 11	102.6
January 17	99.9	January 18	103.8
January 24 (Revised)	101.1	January 25	103.7
January 31	*103.6*	February 1	104.0

COMPARATIVE MONTHLY SUMMARIES

1947							
Jan.	102.1	Apr.	105.1	Aug.	104.2	Dec.	101.5
Feb.	105.9	May	106.2	Sept.	102.0	Year Avg.	104.3
Mar.	106.1	June	106.0	Oct.	109.5	1948	
		July	93.5	Nov.	109.3	Jan.	*100.9*

COMPARATIVE YEARLY SUMMARIES

	1941	1942	1943	1944	1945	1946	1947	1948
Year to Date	86.1	104.3	87.2	88.6	86.7	94.7	103.1	*100.9*
Year Average	97.4	90.4	87.8	88.1	89.4	101.1	104.3	

PAPERBOARD OPERATING RATIOS†

Current Weeks—1948		Corresponding Weeks—1947	
December 27, '47	77	December 28, '46	66
January 3	78	January 4	85
January 10	99	January 11	102
January 17	104	January 18	103
January 24	104	January 25	101
January 31	*103*	February 1	102

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1947	99	103	101	100	101	101	90	99	96	101	99	89	98
1948	*99*												

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

EDITORIAL

Perry Plan

Maybe the plan is too direct and too simple in its approach to the solution of a problem; pretty surely there are some rules that are bound to be broken in a logically conceived idea to help out; but William E. Perry, president of the Cambridge Paper Box Company has conceived a personal program that translates European Recovery Program into terms of his own business. The terms are sufficiently close to others in the paper and paper goods fields to deserve thoughtful attention. Briefly, Mr. Perry proposes that some portion of the ERP, since it is aimed at helping other nations get back into production, be provided from the machine inventories of plants that can spare such portions. Thereby the receiving nations would come into possession of machines that are in good condition, and this would be accomplished without slowing up deliveries of newer equipment from the factories that make it for domestic buyers.

"Because of recent advances in hydraulics and electronics our factories have several obsolete machines in them," Mr. Perry explained. "The machines are perfectly good. They could rebuild Europe. But they'll just gather dust in the more competitive United States industries.

"Instead of letting these rot, or selling them for junk," he said, "why not donate them to the war-torn countries Why not send them abroad where they will help reconstruct societies and lives—and future United States' markets?

"I'm going to start the ball rolling. My company already has packed several machines for shipment, free-of-charge, to Europe.

"I've made a pretty comprehensive investigation of the number of obsolete machines that could be shuttled abroad under this plan and—at a conservative figure—it would mean $1 billion less we'd have to give Europe for purchases."

"The share-the-tools plan would benefit everyone concerned," Perry said. "It would mean a smaller Marshall plan appropriation and that should reflect in taxes. By giving Europe the tools it needs now—on an individual industry basis and without red tape—it would mean a concrete start on the road to recovery for shattered foreign economy. Once European industry started to roll," he said, "our selling abroad would grow—and the foreign countries would be paying in money they had earned, not borrowed.

"It would start a recovery boom now—instead of months of red tape later. It would give Europe hope. It would ease bitterness and the desire to get things through force instead of labor. It would let Europe get to work.

"And everyone wants to be left alone—everyone wants peace—when he's working."

Woods Accidents

Only through the cooperation of all those who don't want accidents to happen can the highly expensive costs of woods accidents be cut down and kept down. There is some kind of a vicious spiral effect observed at times in the inter-action of costs and incidence of mishaps. But a steady determined effort to turn an upward trend downward can be made to show results.

That is the experience of loggers in the British Columbia section of the Pacific Coast, according to John N. Burke, secretary of the British Columbia Loggers Association, who stoutly defends the present efforts that are being made in that area. He does find that with compensation rates somewhat lower the neighboring state of Washington apparently has accidents that are less serious; this is because the lower rate of compensation provides greater incentive to get back on the job.

"The accident record for logging on the coast of B. C. has actually shown an improvement in the last six years. The logging operator has made a sincere, and in some measures, successful effort, to reduce accidents in the woods," said Mr. Burke.

The loggers had been accused of having the highest accident rate in the world and said that unless they did something about it, labor, public sentiment and rising costs would force somebody else to do it for them.

He said that compensation costs had risen from 27 cents in 1927 to 84½ cents per thousand feet of logs today. In a single month there were 660 compensible accidents. In five years, from 1942 to 1947, the time loss through accidents was 20,874 man-days; 78 men were permanently injured, and 200 were killed.

Mr. Burke said: "That the record in B. C. is actually improving is due to this effort of the larger operators to educate their employees in safe working habits.

"It is a matter of record that the members of the B. C. Loggers Association, which includes all the largest operators on the coast, have a better record than the industry generally. These are the so-called "highball" outfits and the charge that the accident frequencies are due to the so-called speed up is easily disproved, since the record shows that the production per man in the woods has decreased steadily since 1938. (In 1932, the rate per man-hour was 190 FBM, today it is 132.)

"To say that the increased number of accidents constitutes a deteriorating record entirely ignores the fact that the number of men in the woods has doubled since 1942. While the number of accidents has increased the number of accidents per man employed has steadily decreased during that period."

W. L. Cook

Editor

CUT DOWN HEAD BOX DILUTION

Close-up of Installation on Head Box Wall

NEW BROUGHTON HEAD BOX SHOWER

PAYS FOR ITSELF IN WATER SAVINGS

Performs efficiently with only a small volume of water. This latest development in low volume, high pressure showers does double duty. It *keeps* head box sides and ends washed down and also acts as a foam killer.

Just one set of spray nozzles rotating in an arc, varying as required, does the job. Results have been especially successful on kraft machines and highly sized stocks.

Write for detailed prints showing ease of installation.

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Also manufacturers of Broughton Unit Vacuum Control Systems for Flat Boxes, and Hydraulically Oscillated Showers for cleaning Cylindrical Screens, Cylinder Moulds, Felts, Fourdriniers, etc.

SECTION OF THE

TECHNICAL ASSOCIATION
OF THE PULP AND PAPER INDUSTRY

122 E. 42nd ST., NEW YORK 17, N. Y. Edited By R. G. MACDONALD, Secretary

Operation of a Fluid Drive*

By Fred W. Atz, Jr.[1]

Abstract

The Electrofluid drive is a new and revolutionary drive, engineered into a compact integral unit, combining a standard general purpose motor with a fluid coupling. It is a highly efficient device, simple in principle and design. The fluid coupling consists of two main elements, impeller and runner, and power is transmitted entirely by the mass and velocity of moving oil between the two elements. The combined unit, motor, and coupling, mounted in a cast iron housing, meeting N.E.M.A. motor dimensions, forms a packaged unit ready for operation.

Hydraulic drives and couplings are classified into two general groups, constant and variable speed. These couplings are also known as fluid couplings, fluid drives, hydraulic drives, and hydraulic clutches. Combining the fluid coupling with a standard purpose motor becomes what is known as the Electrofluid drive.

Construction of Drive

The coupling is made of two main parts—runner and impeller. All are of the double circuit type (two runners and two impellers) except the 1, and 1.5 hp. sizes which are of the single circuit type (one runner and one impeller). The driver or motor end is called the impeller; the driven or load end is called the runner. No metallic connection exists between the runners and impellers. In the double circuit units, the two impellers are mechanically connected to function as a unit; likewise, the two runners are positively connected to function as a unit. The coupling is filled with a light mineral oil of steam-turbine quality. When the motor drives the impeller, it causes oil to flow through the runner buckets back to the impeller, thereby rotating the runner through the medium of the oil. The term circuit refers to the oil medium through which power is transmitted entirely by the mass and velocity of moving oil from the impeller to the runner. The motor rotates the impeller, the multiple blades of which force a continuous flow of oil against the multiple blades of the runner. The runner rotates establishing the circuit by which the power is transmitted from impeller to runner.

Primarily a constant speed unit, it is designed for 1800 r.p.m. synchronous speed, 1730 r.p.m. full load speed. However, it can also be used on 25- and 50-cycle alternating current, having full load input speeds of about 1450 r.p.m. At these speeds, the coupling operates at reduced rating, and in some cases oversize couplings must be used.

Acceleration

Acceleration which is always of a smooth nature depends on the inertia of the driven load—the greater the inertia, the longer the time of acceleration. This is true, for example, of machines with heavy fly-wheels including shears, punch presses, bending rolls, fans, blowers, pumps, etc. In every case, the initial acceleration is more prolonged with the fluid drive than when the connection between motor and driven equipment is solid. Also, the current peaks are lower during the period of acceleration and maximum load conditions when the flywheel effect gives up its energy.

Considerable operating improvement can be expected with the use of a fluid coupling due to the speed characteristics since the torque increases as the square of the speed. The speed during the acceleration period develops torque as the speed increases, placing the entire drive in tension before rotation begins which eliminates all shocks and impacts. During the running period, all load fluctuations are smoothed out in the cushion-like action of the coupling.

The characteristics of the drive are such that the horsepower transmitted varies in proportion to the cube of the speed.

Torque varies as the square of the speed and to the 5th power of the diameter.

Motor torque varies as the square of the voltage.

The motor and coupling are mounted as an integral unit; thus eliminating the base plate assures accurate and enduring alignment, plus compactness and economy.

When used with a mechanical variable speed device, the effect is similar to that obtained from a variable speed hydraulic coupling. However, the speed is more positive, regulation is infinite and the over-all efficiency is higher.

Large size fluid couplings adapt themselves more readily as independently mounted units rather than integrally mounted. This method of design usually applies to 25 hp. and over.

It is adapted to alternating current motors but can be used with direct current motors, preferably 1750 r.p.m. shunt wound motor, which have characteristics similar to the standard general purpose squirrel cage motor.

It is strictly of a constant speed nature. However, it can be used where the source is variable such as slip ring a.c. motors or adjustable speed d.c. motors with a ratio of 2:1 (1800 to 900 r.p.m.). Because of torque speed characteristics of the fluid coupling, a coupling

*Presented at the Second Engineering Conference of the Technical Association of the Pulp and Paper Industry held at The Bellevue-Stratford, Philadelphia, Pa., Nov. 3-5, 1947.

[1] Electrical Engineer, Link-Belt Co., Philadelphia, Pa.

having the torque rating at the lower speed must be used to provide sufficient torque at the lower speeds.

Vertical Operation

It can be used for vertical operation. It will support its own weight including the rotor and coupling. Any additional downward thrust must be supported independently. Herringbone gears, V-belts, flat belts, and chain drives usually require no additional support. Single helical gears, depending on rotation, can cause additional thrust, upward or downward, therefore must be supported independently. Any shaft extensions must also be supported.

Protection

The use of fluid drive does away with shear pin protection which at its best is erratic and permits abuses in using substitutes for the shear pins, usually resulting disastrously. Protection usually is in the form of thermal overload relays, but can also be provided to trip on definite values where such protection is deemed vital to the protection of the machinery. In the former, the thermal units (heater elements) operate on a thermal basis. Should the driven machinery become stalled or slowed down because of heavy overloaded conditions, the motor speed is also reduced to the point where maximum or near maximum torque is developed, resulting in excessive current being consumed. This excess current heats the heater elements and in approximately 15 to 25 seconds the relay trips opening the motor circuit. The starting and protective equipment is perfectly standard, being of the across-the-line type of magnetic switch providing overload and undervoltage protection. It is the simplest form of equipment that can be used for remote control. The preset type of overload protection where the maximum torque, such as 150 to 200 or 250%, to be transmitted can be predetermined, is accomplished by means of a preset instantaneous trip overload relay. This relay is out of circuit during the acceleration period during which time the thermal relay provides the protection. Where thermal elements provide the protection, overload peaks of short duration may occur. The motor through the fluid coupling absorbs these peaks until operation returns to normal.

Plugging for Quick Reversals and Stopping

The motor can be actually reversed from full speed forward to full speed reverse by the mere pressing of the respective buttons. The action is such as to apply maximum reverse torque to the fluid coupling until the driven equipment actually rotates in the reverse direction. Quick accurate stopping can be effected by means of a plugging switch mounted on the driven shaft. This switch works on the centrifugal principle throwing reverse current into the motor until the driven equipment stops. Just before the driven equipment stops, the plugging switch opens the entire motor circuit. At this point, a solenoid brake can be applied, should it be necessary to hold the load. By the use of this method, the fluid drive provides smooth deceleration and final stopping both by the quick stopping and the reversal method.

Maintenance is reduced practically to zero. The main item being an occasional inspection of the oil level to insure maximum efficiency and protection.

Since motors can be closely rated to meet required capacities, the power factor will be the maximum of the motor. It is well known that the power factor is low on a motor which develops only partial load. A fully loaded motor develops maximum power factor. This can become an important item, as most public utilities penalize their customers in direct relation to the existing power factor on their system up to prescribed requirements which usually is 90%. As previously mentioned, the fluid drive permits the motor to utilize its maximum torque. Therefore, in most cases, regardless of the inertia, motors can be selected for the running load.

The initial start of the motor is so rapid as to nullify the current peak since the momentary locked rotor condition is negligible. This is because of the fact that the motor accelerates rapidly up to approximately 70% full load speed before it exerts sufficient torque to accelerate the driven machine. At this speed the current approximates three times full load current as compared with the usual starting peaks of six times full load running current.

There are many advantages inherent in this type of unit. The principal advantages are:

1. To eliminate shocks, impacts, and torsional vibration.
2. To insure continuous smooth operation.
3. To maintain full torque at all output speeds.
4. To permit the use of a motor closely rated to the developed load to be driven.
5. To prevent stalling of the motor.
6. To eliminate shear pins and other similar protective devices.
7. To permit the use of a standard mtor (a.c. and d.c.), eliminating the use of high torque, and high slip motors.

The application of the fluid drive is widespread in the industry in general. However, in the paper making industry its use has been limited because of the fact that it has not been exploited to any extent. It has been successfully applied to slitters and cutters and, because of its characteristics, lends itself to numerous applications in this particular field.

TAPPI Notes

Edgar M. Pierce, formerly of Chas. T. Main, Inc., is now with Alonzo B. Reed, Inc., Consulting Engineers, 80 Broad Street, Boston, Mass.

The TAPPI Ohio Section will meet at the Manchester Hotel, Middletown, Ohio, on March 11th. The discussion will deal with Resins—A key to Expanding Markets for New Papers.

The Western New York Group of the TAPPI Empire State Section will meet at the Prospect House, Niagara Falls, N. Y. on February 16th at 6:45 p.m. Jack Haley, Traffic Manager of the Niagara Alkali Company, Niagara Falls, N. Y. will talk on "Transportation."

There will be a delay in the distribution of the TAPPI Year Book. The 450 metal plates for this book had been completed and were ready for printing when the Brock Press in Stamford, Conn. was destroyed by fire. Although the plates were covered by insurance it is unfortunate that this further delay will be necessary. The membership roster, however, will be brought up to date and will be accurate at the time of delivery.

The TAPPI Empire State Section will hold its annual meeting at the Woodruff Hotel, Watertown, N. Y. on June 3-5, 1948. P. D. Switzer and H. M. Rice are co-chairmen and James E. Foote, C. E. Libby and B. L. Kassing constitute the program committee.

The Northeast Section of the Forest Products Research Society will meet at the Hotel Pennsylvania in New York City on February 27th. Members of TAPPI are invited. William B. Darling of the Riegel Paper Corporation will talk on "The Resin Impregnation of Paper During the Manufacturing Process." Further details may be obtained from James F. Hamilton, Perkins Glue Company, Lansdale, Pa.

Factors Involved in Selection of Stationary Steam Generating Units*

By W. S. Patterson[1]

Abstract

In discussing steam generating units it is necessary to classify them as "small" or "large." The author has assumed that the dividing line is 100,000 pounds per hour steaming capacity.

All small boilers are standardized with respect to details of construction, drum sizes, width, tube lengths and drum centers, but the boiler must be selected to suit the method of firing, and the arrangement is often influenced by such factors as space limitations and draft limitations. The following types are listed in the small boiler class: horizontal return tubular (fin tube): three drum low head bent tube; box header straight tube; two drum vertical bent tube; three drum vertical bent tube; four drum vertical bent tube and sectional header straight tube. The trend in recent years has been toward bent-tube water-tube boilers.

The selection of a large steam generating unit demands consideration of certain basic requirements, all of which are involved. These are listed and discussed as: (1) customer's preference, (2) building limitations, (3) evaluations, (4) maximum capacity, (5) capacity range, (6) steam temperature, (7) steam temperature control range, (8) pressure, (9) fuel temperature, (10) fuel and analysis, (11) auxiliary or future fuel, (12) nature of feedwater, and (13) desired efficiency.

In discussing this subject steam generating units must first be classified as "small" or "large" because the factors affecting selection are somewhat different in these two categories. It is however difficult to select a satisfactory dividing line because a boiler which would be considered large in the paper manufacturing industry might be considered small in the public utility field. For the purposes of this paper, steam generating units of less than 100,000 pounds per hour steaming capacity will be considered as "small" units.

Small Steam Generating Units

In general the equipment purchased will be the lowest cost unit that will satisfactorily meet the requirements of the installation. The minimum cost installation may, however, consist of a relatively expensive boiler unit which because of its size or shape reduces the amount of changes involved in an existing building. In many cases involving new small boilers they must be installed in existing boiler rooms where head-room is limited; also the location of existing columns often fixes the width and depth of the space in which the new unit must be installed.

Practically all small boilers are standardized with respect to details of construction, drum sizes, widths, tube lengths or drum centers, and the determination of heating surface simply involves the use of a tabulation of the various sizes and dimensions.

Usually the minimum cost boiler is obtained by using the minimum furnace width which will satisfactorily supply the desired steam quantity but the fuel burning equipment may dictate the width, since one type of fuel burning equipment may require a wide furnace while another will operate well with a narrow one. For example the ideal arrangement for a travelling grate stoker will be a long narrow grate, whereas for best results at the same capacity a spreader stoker should have a wider and shorter grate.

The furnace volume also plays an important part in fitting a new unit into an existing space, and hence the method of firing comes into the picture in another way since stokers require less furnace volume than pulverized fuel for the same fuel burning rate.

Particularly in the case of small standardized boilers the purchaser sometimes has a decided preference for equipment of the same type as previously installed if its performance has been satisfactory. There are several reasons for this; first, it may be possible to use the same spare parts on new and old boilers; second, the operators are familiar with the equipment and will not be required to change operating methods; third, the equipment usually fits the space conditions better and improves the appearance of the boiler room.

Draft conditions often influence the boiler selection. If the draft is to be furnished by an existing stack there is obviously less latitude in selection than if an induced draft fan is to be furnished.

The trend in recent years has been toward bent tube boilers. This has been brought about because standardization and improved fabricating methods have resulted in reduced cost and because the circulation in bent tube types has proven superior to straight tube types at high ratings due to the steeper inclination of the tubes. Several manufacturers have developed standardized so called "package" boilers of the low head bent tube type equipped with water cooled furnace walls. Other types used for low head-room conditions are the horizontal return tubular, the straight tube types, the three drum low-head and the two drum vertical bent tube type.

Some users of small boilers still talk in terms of boiler horse power and per cent of rating but the industry prefers to rate power boilers in terms of actual steam generating capacity because the use of superheaters, economizers and water walls has made the older methods of stating capacity quite meaningless.

The following tabulation lists the types of boilers in the order of their cost exclusive of setting. The limitations given must be considered as approximate because each type has been used in a few instances for higher capacity, pressure, or superheat.

(1) Horizontal Return Tubular (Fire Tube)
Capacity limit about 20,000 lb./hr.
Pressure limit about 200 p.s.i.
Superheat limit about 150°F.
Applications: low head-room with hand firing, stokers, oil or gas.

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* Presented at the Second Engineering Conference sponsored by the Technical Association of the Pulp and Paper Industry at The Bellevue-Stratford, Philadelphia, Pa., Nov. 3-5, 1947.

[1] Combustion Engineering Co., Inc., New York, N. Y.

(2) Three Drum Low Head Bent Tube
Capacity limit about 35,000 lb./hr.
Pressure up to 400 p.s.i.
Superheat up to 100°F.
Application: Low head-room, stoker, oil and gas firing.

(3) Box Header, Straight Tube
Capacity limit about 75,000 lb./hr. without water walls
Pressure up to 300 p.s.i.
Superheat up to 150°F.
Applications: with stokers, oil or gas firing
Requires tube removal space. Not extensively used in recent years.

(4) Two Drum Vertical Bent Tube (with water cooled furnace)
Capacity up to 300,000 lb./hr.
Pressure up to 1000 p.s.i.
Steam temperature up to 900°F.
Applications: Industrial and utility power plants; adaptable to all methods of firing.

(5) Three Drum Vertical Bent Tube
Some manufacturers offer this type in small sizes but the author's company has developed it for public utility use for capacities up to 1,000,000 lb./hr. for the full range of pressures and temperatures and for all methods of firing.

(6) Four Drum Vertical Bent Tube
Capacity up to 300,000 lb./hr. (with water walls)
Pressure up to 1000 p.s.i.
Steam temperature up to 800°F.
Adaptable to all types of firing.

(7) Sectional Header Straight Tube
Capacity up to 500,000 lb./hr. (with water walls)
Pressure up to 1000 p.s.i.
Steam temperature up to 850°F. (interdeck)
Adaptable to all types of firing, but superseded by bent tube type boilers, for high pressure.

Large Steam Generating Units

In selecting large units particular consideration must be given to certain basic requirements which are found in the customer's specifications, or which must be determined before a satisfactory selection can be made. These are: (1) customer's preference, (2) building limitations, (3) evaluations, (4) maximum capacity, (5) capacity range, (6) steam temperature, (7) steam temperature control range, (8) pressure, (9) feed temperature, (10) fuel analysis, (11) auxiliary or future fuel, (12) nature of feedwater, and (13) desired efficiency. Each of these basic requirements in turn governs many "design factors" such as those enumerated in Tables I to XIII some of which will be briefly discussed.

Customer's Preferences

As in the case of small boilers the customer's preferences must receive first consideration. Such preferences are often based on (a) the desire to obtain a type of unit with which he has had satisfactory results, (b) the desire to purchase equipment of a type with which his operating personnel is familiar, and (c) the desire to use an arrangement which fits well along side of existing units in the plant.

Building Limitations

Building limitations must receive second consideration particularly if the new unit is to be placed in the space provided by removing one or more old boilers. In many such cases it is possible to install new units having several times the capacity of the old while at the same time using the existing coal bunker and providing operating floor and fan floor at the same level as previously used. Preferred locations for pulverizers, fans, air heater and dust collector must of course be determined in advance even where no building space limitations are specified.

Evaluations

Even before a preliminary selection is made the designer will want to consider evaluations. These are really monetary penalties that will be applied to the bid price in an attempt to put all bids on the same basis as regards space occupied, power consumption of auxiliaries such as fans and pulverizers, and overall efficiency. Obviously if the desired efficiency can be obtained with a low draft loss unit it would not be wise to bid on a high draft loss unit unless the evaluation for saving in space would more than offset the increased cost of heating surface, etc., of the low draft loss unit. Low draft loss generally goes hand in hand with low gas velocity and an increase in the required amount of heating surface.

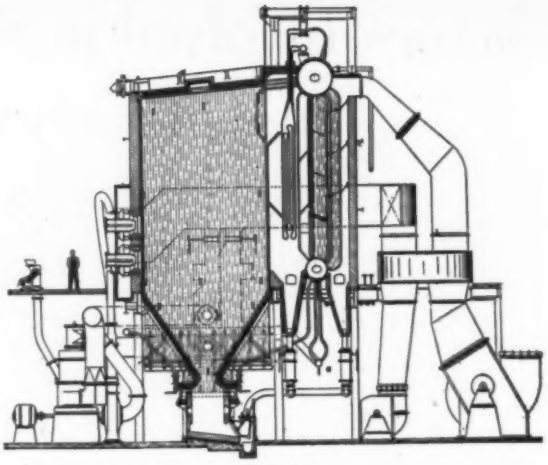

Fig. 1.

Two Drum Boiler, Coal Fired, Water Cooled Furnace and Hopper Bottom. Continuous Capacity 242,000 lb./hr. at 788°F. and 455 lb. pressure. Width 26 ft., Regenerative Air Heater, 81.2% Efficiency with Low Grade Coal.

Capacity

Several design factors are closely related to size or capacity of the steam generating unit. One of these is type of firing except in localities where gas or oil is the primary fuel and coal need not be considered. But wherever coal firing must be considered either as primary, emergency or future fuel the decision has to be made between stokers and pulverized fuel. This is not difficult in many cases because stokers are limited to small and medium sized units, although a few stoker installations have been in the capacity range 300,000 to 500,000 pounds per hour. On the other hand pulverized fuel is not economical when the size of the unit is too small. The kind of coal generally available at the plant will also influence the decision

Another factor related to capacity is furnace width which enters the picture in several ways because it affects fuel burning rate, draft loss and effective steam drum length as well as cost of unit. The drum length and diameter fix the volume of the drum which must be large enough for installation of the necessary steam purification apparatus. Boilers having a single upper drum are generally wider for the same capacity than those with two or three upper drums when other things are equal, but sometimes the fuel burning equipment rather than drum capacity will fix the width.

Range of Capacity

The range of capacity governs certain factors of design. For example it will influence the type of boiler offered when the boiler is to be used as standby protection for a hydroelectric system. In the event of failure of power supply such boilers are often called upon to increase their output twenty fold in a few seconds and are generally selected with large water content capacity and oversize auxiliaries. The range of capacity also affects type of firing, and

stokers are often favored over pulverized coal for small or medium sized units that must handle frequent load swings of as much as 10 to 1 and operate for considerable periods of time at greatly reduced load. However, stokers are not commonly used for units greater than 200,000 pounds per hour steaming capacity. With pulverized fuel firing a greater range of capacity can be obtained with turbulent burners, but the characteristics of the pulverizers also play a part in direct fired installations. Gas or oil fired installations are best suited to a wide range of capacity provided the burner selection is carefully made. Unless special wide range burners are used a large number of burners is required.

Pulverized fuel units designed for a wide range of capacity and which must operate for long periods at low load will have dry ash removal systems in the furnace floor rather than slag tap types; also they will require a larger number of pulverizers and burners with an emphasis on not having pulverizers and burners with too much capacity tolerance.

Units designed for a wide capacity range must have means provided to prevent trouble resulting

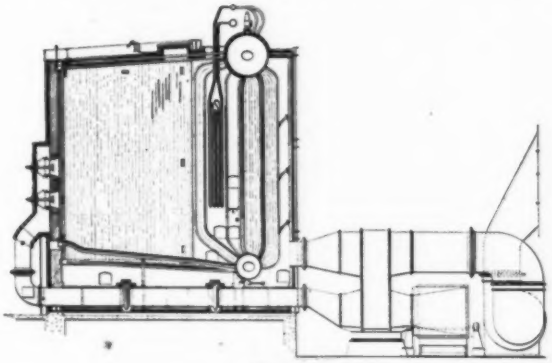

FIG. 2.
Two Drum Boiler, Oil or Gas Fired, Water Cooled Furnace with Refractory Covered Floor Tubes. Continuous Capacity 176,000 lb./hr. at 850°F. and 650 lb. pressure. Width 19 ft., Regenerative Air Heater, 84.6% Efficiency with Oil Firing.

from gases leaving the unit below the dew point during low load operation.

Steam Temperature

The specified steam temperature leaving the superheater has a very great influence on the type of boiler selected for the simple reason that it affects the size and location of the superheater. In boilers of standard types such as those listed under small steam generating units the superheat obtainable is limited by the space allotted for installation of the superheater. When steam temperature of 900 to 950° F. is required the superheater becomes very large and the corresponding gas temperature drop very great. Therefore, in order to have an economical temperature difference between gas and steam at the cold end, the gas inlet surface of the superheater must be located in a zone of high gas temperature; this limits the amount of convection boiler surface which can be used in the screen between furnace and superheater.

Some users of large boilers are now specifying steam temperatures of 1000° F., 1050° F., or even 1100° F. and some are planning interstage reheating to 1000° F. It may be truly said of such units that the rest of the installation is really built around the superheater because in such cases the heat absorption of the superheater may exceed 40% of the total absorption by all pressure parts including furnace, boiler and economizer.

When the gas temperature entering the superheater must be close to the fusion temperature of the ash it is customary to divide the superheater surface into two or more sections having a wide tube spacing in the gas inlet section and a much closer spacing in the gas outlet section.

Superheater materials must of course be satisfactory for the temperature and stress encountered, and some installations require as many as four different alloy steels in addition to the plain carbon steel used at the steam inlet end.

Steam Temperature Control Range

Another basic requirement which influences steam generator design is the steam temperature control range, or the load range over which the steam temperature must be held constant. It is characteristic of a convection type superheater that the outlet steam temperature increases as the load increases, and this increase may amount to 75° F. from half to full load. Radiant superheater surface located in the furnace walls will have the opposite characteristic with much less variation, but radiant superheaters are not extensively used. However, the use of a part radiant superheater may be listed as one means of obtaining a steam temperature that will not increase too much with increase in load. Nevertheless, some means must generally be provided to actually *control* the steam temperature, within limits, and this will influence the type of unit selected.

All or any one of four means of control may be provided such as adjustable burners, dampers, desuperheater or furnace wall blowers. Burners and wall blowers give steam temperature control by producing a variation in gas temperature entering the superheater; dampers give control by varying the quantity of gas flowing over all or a portion of the superheater surface; desuperheaters reduce the steam temperature leaving the unit either by water sprays or cooling surface, and they may be located between sections of the superheater or at the outlet. Another method involves means for condensing saturated steam between boiler and superheater inlet to control superheater outlet temperature.

When dampers are used the arrangement of the surface of boiler and superheater must be coordinated to effectively bypass a predetermined portion of the superheater surface, to effectively cool the bypassed gas, to provide a reasonably cool location for the

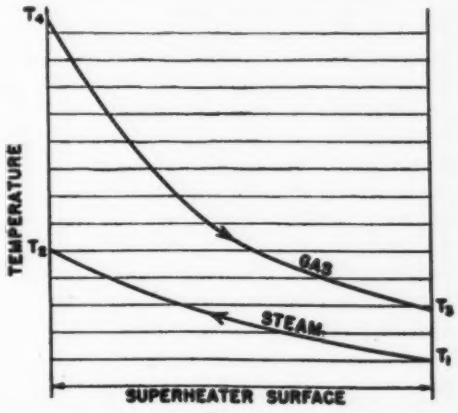

FIG. 3
Relationship between steam temperature rise and gas temperature drop in a convection superheater.

dampers, and to facilitate the installation of a damper arrangement that will be positive and quick-acting in the control of superheat, and adaptable to use with automatic controls.

The effect of steam temperature control range on gas temperature requirements at furnace exit will be discussed later in this paper.

When spray type desuperheaters are the sole means of temperature control a large quantity of water is used in the sprays which has bypassed the economizer but which is converted into superheated steam. The reduced flow through the economizer decreases economizer efficiency in the upper load range because the outlet water temperature will more rapidly approach the saturation temperature.

Pressure

The pressure for which the unit must be built will also govern several design factors such as type of boiler. However, higher pressures generally go hand in hand with higher steam temperatures and both affect the type of boiler. High pressure decreases the specific volume of the steam, making it possible to use fewer or smaller boiler drums, which reduces the cost. Some high pressure boilers use only one drum.

At high pressure the density of water and steam approach each other thus reducing the head which produces thermal circulation. For this reason generous downtake and generating tube diameters must be employed; but since tube diameter and wall thickness are roughly directly proportional the point is reached where wall thickness becomes critical. This condition results in a large temperature gradient across the tube wall, a high temperature on the hot face of the tube and a high temperature stress in the tube wall. It is for these reasons that high pressure boilers are sometimes provided with refractory protection on the fire side of furnace wall tubes if the tubes are very thick. Other alternatives are to use smaller diameter tubes, or forced circulation, in which latter case very small, thin-wall tubes are used.

In high pressure boilers the boiler water dissolved solids concentration is generally held at a lower figure than in low pressure boilers by continuous blowdown. Blowdown rate must be taken into consideration at time of boiler selection particularly if feed water makeup is high in quantity and total solids.

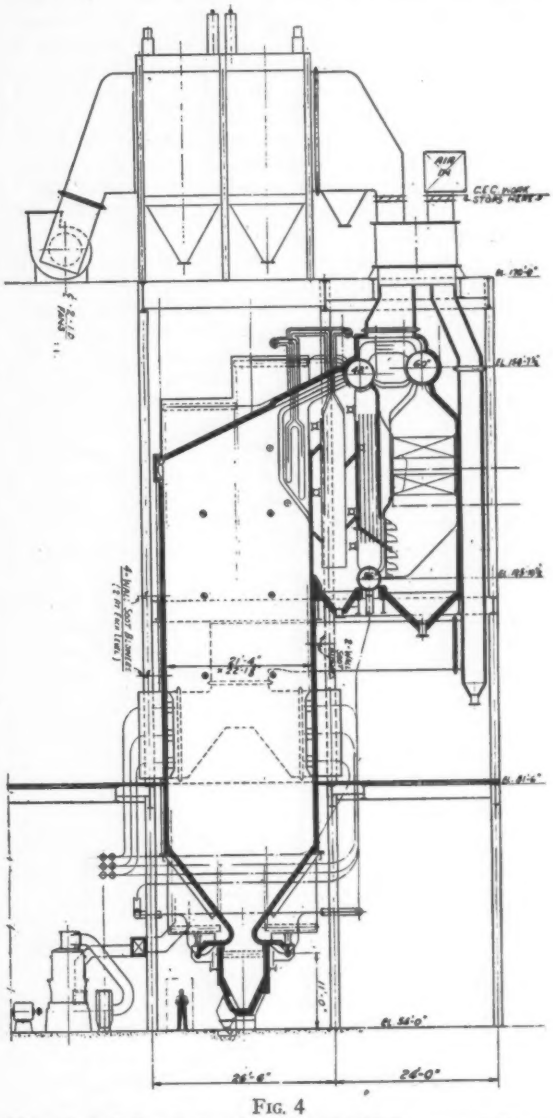

Fig. 4

Three Drum Boiler, Coal or Oil, Water Cooled Furnace and Hopper Bottom Continuous Capacity, 400,000 lb./hr. at 905 F. and 875 lb. pressure, Width 22ft., Economizer and Air Heater, 88% E ciency with Good Coal Controlled Superheat with Tilting Tangential Burners and By-Pass Dampers.

Feed Water Temperature

The next basic item is feed water temperature which the designer uses to calculate required total heat absorption of the unit and the maximum percentage of that total which could be absorbed in an economizer, without steaming.

The feed water temperature determines the metal temperature in an economizer, which should be above the dew point of the flue gas because the temperature of the gas film in contact with the metal will approach the metal temperature regardless of the mean gas temperature. Since deaerated feed water is generally used in large boilers the minimum feed water temperature is usually 215 to 220°F. but a temperature as high as 580°F. has been specified for very high pressure units, and is obtained by high pressure extraction feed water heaters. Sometimes a unit must be designed for maximum capacity with some of the feed water heaters out of service and this increases the heat output of the unit and affects the selection of fuel burning equipment, fans, superheater and steam temperature controls. It is easiest to design a unit for constant steam temperature over a wide load range when the feed water temperature increases as the load increases, and when a load reduction is permitted if a feed water heater is out of service.

Fuel Analysis

The fuel analysis is a very important item of the customers' specifications, particularly when several fuels must be used either separately or simultaneously. When gas or oil are to be used and there is more than one kind of gas or oil specified, with considerable variation in heat value, the use of forced draft burners is preferable to natural draft burners.

The design factors related to coal analysis are listed in Table X for pulverized coal firing and are self-explanatory to anyone reasonably familiar with that method of firing. For stoker firing additional items of knowledge about the coal are desirable or necessary such as (a) sizing analysis (b) iron oxide content of ash (c) burning characteristics. Each type of stoker is best suited for a limited range of fuels and certain fuels which are well suited to a particular type at normal rates of combustion may give trouble at ex-

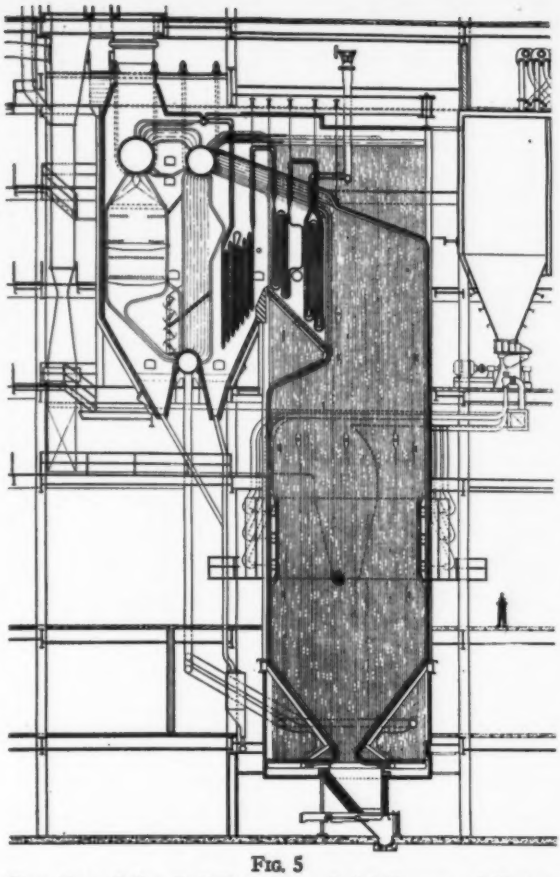

FIG. 5

Three Drum Boiler, Coal Fired, Water Cooled Furnace and Hopper Bottom Continuous Capacity, 600,00 lb./hr. at 950 F. and 1380 lb. pressure, Width 30 ft., Economizer and Air Heater, 88% Efficiency with Coal Firing Controlled Superheat with Tilting Tangential Burners and By-Pass Dampers.

tremely low rates due to overheating the grates. But fuel burning equipment is a subject not within the scope of this paper.

Auxiliary or Future Fuel

The specified use of auxiliary or future fuel must also receive careful consideration. It may affect the type of firing offered. For example, if the present fuel is gas or oil and the future or auxiliary fuel is coal, a future or auxiliary pulverized fuel installation would result in less changes to the setting because burners can be designed to burn all three fuels separately or simultaneonsly. On the other hand if the primary and present fuel is coal with oil or gas as future fuel and the unit is of medium size a stoker may be best suited for initial operation with provision for future oil or gas burners in the rear wall of the furnace. The circumstances of each individual case must be reviewed in reaching such decisions.

Of all the fuels specified the one requiring the largest furnace volume will fix the initial volume unless changes in furnace will be permitted for a future fuel. Furnace bottom type must also receive special consideration. No unit will give the same performance with all fuels and it is much more difficult to design a unit to operate satisfactorily with all of several fuels than with one. Unless superheat control is furnished or superheater changes are made when changing from one fuel to another, a different steam temperature may be obtained with each fuel.

Other design factors obviously associated with the use of an auxiliary fuel are listed in Table XI.

Nature of Feed Water

The nature of the feed water governs the factors listed in Table XII some of which are of particular interest to the water consultant and others to the boiler designer.

Desired Efficiency

When the desired efficiency of the unit is specified it is not too difficult to arrive at a trial value of exit gas temperature which is then used as a guide in equipment selection. Most large boilers designed for an overall efficiency of 85% or higher will require heat recovery equipment including both economizer and air heater. If the unit is stoker fired the air heater will be small and the economizer large, but the reverse is true for a pulverized fuel installation, the reason being that stokers do not tolerate high preheated air temperature whereas most pulverized fuel systems require it. Consequently, on units of only moderate efficiency the air heater will be omitted on the stoker fired installation and the economizer omitted on the pulverized fuel installation. Gas and oil fired units will have heat recovery equipment proportioned about the same as for pulverized fuel because from the standpoint of economics a large air heater and small economizer is cheaper than the reverse combination.

When the desired efficiency results in a gas temperature quite close to the dew point at normal full load, as will often be the case in large high pressure units, means are generally provided to control the cold end air heater metal temperature by recirculating preheated air or by passing cold air. Nothing much can be done to protect an economizer except complete gas bypassing because the metal temperature in contact with the gas is fixed by the feed water temperature.

Figures 1 and 2 illustrate typical applications of two drum boilers in sizes commonly used in large industrial power plants.

Outline of Calculations Involved in Equipment Selection for Large Units

1. Capacity, pressure, and steam temperature determine the heat in the steam leaving the unit, from which the heat in the feed is substracted to arrive at the heat output of the unit at various loads such as minimum, "control point" and maximum.

2. Experienced judgment plus information from the specifications are then used to assume the efficiency at each load and calculate the required heat input in the fuel.

3. From the heat input and excess air the gas weight may then be calculated.

4. It may be said of large high-temperature steam generating units that the superheater requirements to a large extent determine the type of unit. This is true to a certain extent in the 900 to 1000°F. designs, but to a much larger extent when higher steam temperatures are required or when there is both high superheat and high reheat.

Figure 3 illustrates the relationship between steam temperature rise and gas temperature drop in a convection superheater. The steam temperature rise (T_2-T_1) and the pressure fix the heat to be absorbed per pound of steam and this superheat may be specified constant over a wide range of loads. If the feed water temperature and excess air are nearly constant then the gas weight per pound of steam and

the gas temperature drop (T_4-T_3) will also be nearly constant over the superheat control range.

The amount of surface installed in the superheater, and the degree to which true counterflow is approached, will determine the cold end temperature difference (T_3-T_1). A counterflow arrangement will economically give a gas temperature drop (T_4-T_3) equal to 85% of the temperature difference (T_4-T_1) at the design or "control point, when the control point is at 50% of maximum load. The absorption efficiency will then fall off to 75% at maximum load due to the fact that the heat transfer rate in the superheater does not increase in direct proportion to the increase in gas weight. Therefore, the entering gas temperature T_4 required to maintain constant steam temperature T_2 will increase only moderately with rating when the feed water temperature remains constant.

For example, the gas temperature drop (T_4-T_3) in a convection superheater, corresponding to a 400°F. steam temperature rise (T_2-T_1), will be about 1025°F. and the temperature difference (T_4-T_1) may be taken as 1025/0.85=1200°F. (approximately) at the control point and 1025/0.75=1365°F. at the maximum load, for 50% control range. These figures fix the required gas temperature entering the superheater at 1800°F. for the control point and 1965°F. at the maximum load when the saturated steam temperature T_1 is taken as 600°F. (The gas temperature drop across the row of boiler tubes located between the sections of the superheater will just about offset the effect of direct radiation to the superheater). Now the temperature drop across the screen tubes ahead of the superheater must be added (about 100°F.) to arrive at gas temperature required at exit from the furnace, i.e., 1900°F. at the control point and 2065°F. at maximum load.

A furnace must therefore be selected to give an exit temperature of 1900°F. at 50% of maximum load. A selection based on fixed tangential or horizontal turbulent burners would give trouble at maximum load because the furnace exit temperature would be about 2150 to 2300°F. respectively which would exceed the ash fusion temperature of some coals and greatly exceed the temperature required to obtain the specified steam temperature. An alternative with fixed burners is to place part of the superheater in the furnace walls or in the walls of an open pass where temperatures above the fusion point can be tolerated. This will reduce the amount of convection superheater required and will therefore reduce the required gas temperature entering that surface.

With tilting burners, which in effect give an adjustable furnace, the solution is simpler and more flexible. The furnace can be designed to give the required 1900°F. at the control point with burners horizontal and they are tilted downward at higher loads to limit the gas temperature increase to exactly that required to give the constant steam temperature.

Bypass dampers are employed as a supplementary means of steam temperature control in the units shown in Figs. 4 and 5. Specifications often impose an emergency condition of low feed water temperature when some of the feed water heaters are out of service. To maintain constant steam temperature at high loads with lower feed water temperature is equivalent to a large increase in the control range and supplementary steam temperature control is necessary or desirable under these conditions. The extent to which the bypass dampers will be used is checked by calculating the gas temperature requirements at the superheater inlet under normal and

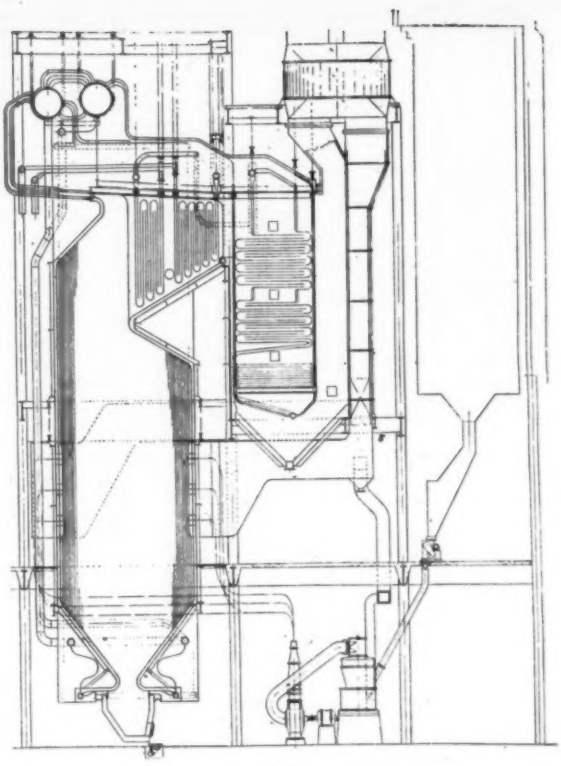

FIG. 6

Special Design Reheat Boiler, Coal or Oil, Water Cooled Furnace and Hopper Bottom, Continuous Capacity 585,000 lb./hr. at 1000 F. and 1465 lb. pressure, Reheat Steam Flow 535,000 lb./hr. at 1000 F. and 325 lb. pressure, Width 30 ft., Economizer and Air Heater, 89% Efficiency with Coal Firing Controlled Superheat and Reheat with Tilting Tangential Burners and Spray Desuperheaters.

TABLE I.—CUSTOMERS PREFERENCES

DESIGN FACTORS

Type of firing	{Stokers / Pulverized fuel} — {Vertical / Horizontal / Tangential}
Type of furnace bottom	{Slag top / Dry bottom}
Type of boiler unit	
Kind of air preheater	{Ljunstrom / Tubular / Plate}
Location of fans	{Basement / Roof}

TABLE II.—BUILDING LIMITATIONS

DESIGN FACTORS

Outdoor	{Wind load / Water proofing / Partial enclosure}
Earth quake factors	
Width, depth and height	
Location of auxiliaries	{Mills / Fans / Air heaters / Dust collectors}

TABLE III.—EVALUATIONS

DESIGN FACTORS

Auxiliary power requirements	
Draft loss and pressure drops	
Building space	{Height / Plan area}
Efficiency	

TABLE IV.—CAPACITY

DESIGN FACTORS

Type of firing	{Stokers / P.F., gas, oil}
Type of burners	{Tangential / Horizontal / Vertical}
Furnace width	
Drum length	
Minimum number of mills and burners	
Minimum number of fans	
Minimum number of air heaters	

TABLE V.—RANGE OF CAPACITY

DESIGN FACTORS

Type of unit
Type of firing
Type of furnace bottom
Number and capacity of mills
Number and capacity of burners
Minimum exit gas tempertaure

TABLE VI.—STEAM TEMPERATURE

DESIGN FACTORS

Total heat output of unit
Absorption between furnace and superheater outlet
Gas temperature drop between furnace and superheater outlet
Minimum economical gas temperature leaving superheater
Minimum required gas temperature entering superheater
Convection surface ahead of superheater
Superheater arrangement
Superheater materials

TABLE VII.—STEAM TEMPERATURE CONTROL RANGE

DESIGN FACTORS

Type of unit
Type of control
Arrangement of surface
{Burners
{Dampers
{Desuperheaters
{Wall blowers

Furnace exit temperature
Steam generation in desuperheaters
Steam generation in economizer
{Required at control point
{Limit at maximum rating

TABLE VIII.—PRESSURE

DESIGN FACTORS

Type of boiler
Circulation
Tube diameter
Tube thickness
Drum thickness
Minimum gas temperature leaving boiler surface
Boiler water concentration
Drum steam space
Welded tube joints

TABLE IX.—FED WATER TEMPERATURE

DESIGN FACTORS

Heat in feed
Economizer heat absorption (limit)
Economizer metal temperature

IF VARIABLE IT AFFECTS

Output of unit
Mill and burner requirements
Draft loss
Fan requirements
Steam temperature
Steam temperature control range

TABLE X.—COAL ANALYSIS

DESIGN FACTORS

GRINDABILITY AFFECTS

Mill size
Mill power consumption

ASH CONTENT AFFECTS

Allowable gas velocity
Soot blowers

ASH FUSION TEMPERATURE AFFECTS

Allowable furnace exit temperature
Tube spacing at furnace exit

VOLATILE CONTENT AFFECTS

Burner selection
Burner capacity range
Coal fineness

MOISTURE CONTENT AFFECTS

Mill size
Required preheated air temperature
Heat loss

HEAT VALUE DETERMINES

Fuel quantity
Mill capacity

TABLE XI.—AUXILIARY OR FUTURE FUEL

DESIGN FACTORS

MAY AFFECT

Type of firing
Furnace size
Furnace bottom type
Steam temperature control
Auxiliary burners
Provision for soot blowers
Tube spacing
General overall design
Pulverizer size
Fan size

TABLE XII.—NATURE OF FEED WATER

DESIGN FACTORS

Chemical treatment
Boiler water concentration
Rate of blowdown
Blowdown heat loss
Boiler water constituents
Steam purification internals
Sludge elimination
Circulation
Drum steam release rate

TABLE XIII.—DESIRED EFFICIENCY

DESIGN FACTORS

Exit gas temperature
Economizer vs. air heater
Economizer—air heater combination
Dew point of flue gas
Control of air heater metal temperature {Bypassing / Recirculation

emergency maximum load conditions. If the gas temperature control requirements exceed the control range obtainable with tilting burners then the bypass dampers are relied upon and the design calculations take this into consideration. The maximum range of control can be obtained by selecting the furnace large enough to require partial upward tilt of the burners at the control point, and maximum downward tilt at maximum load supplemented by some other means of control.

5. Having decided on a convection superheater, tilting tangential burners and required gas temperature leaving the furnace at the control point the next step is to proportion the furnace to accommodate the burners and to give the desired leaving temperature. The width is to a certain extent fixed by the capacity of the unit. The amount of variation permitted depends on type of unit but the width chosen may affect the arrangement of superheater and economizer because of gas velocity considerations.

The furnace width is related also to drum relieving capacity except with special designs where the drum length can be chosen independent of furnace width within reasonable limits. The depth is fixed largely by the burners because certain width to depth relationships are also maintained with tangential firing. The height must be chosen with consideration to the burners. With tangential firing a suitable distance is maintained between the upper burners and the entrance to the superheater and between the lower burners and the hopper. The final proportions must, of course, suit the building limitations and provide a furnace having the necessary water-cooled surface to give the desired gas temperature entering the superheater at the control point.

These two designs (Figs. 4 and 5) both employ a water-cooled hopper-bottom furnace because the range of furnace temperature control is greatest when a considerable portion of the furnace heating surface is located below the level of the burners.

An empirical method of determining furnace heat absorption is used. This method is based on numerous tests over a period of years on steam generating units of different sizes, having different methods of firing and operating at variable rating under different conditions of furnace cleanliness. The results have been correlated by plotting furnace heat absorption rate against release rate with method of firing, furnace cleanliness, and excess air as parameters. With the advent of tilting burners, the angle of tilt has also been taken into consideration and numerous tests have been conducted to establish the effect of burner adjustments.

6. Superheater selection and arrangement must satisfy many other requirements besides absorbing the necessary heat. The tube diameter and circuit length must be proportioned to suit the allowable pressure drop; the element spacing in a direction transverse to the gas flow must be satisfactory for the gas temperature, velocity and ash content; the free area must be chosen to suit the draft loss; the depth spacing must not impose fabrication difficulties; the circuit arrangement must be chosen so as to insure an efficient temperature difference between gas

and superheater surface in all parts of the superheater because this affects the amount of surface installed; and, finally, the materials chosen must be suitable for the metal temperature expected which, in turn, is a function not only of the fluid temperature inside the tube but also of the rate of heat absorption by the surface.

Modern high capacity units invariably employ two or more transverse spacing arrangements and two or more superheater sections. The section nearest the furnace has wider spaced elements, lower gas velocity and higher steam velocity than the cold-end section. Because the temperature difference is great the section nearest the furnace is often arranged for parallel instead of counter flow to reduce the maximum metal temperature. This does not add to the cost of the superheater because, although the required surface may be slightly greater, less of the more expensive alloy is required.

The units shown in Figs. 4 and 5 employ pendant type elements with all load carrying supports located outside the setting. Figure 5 shows a counter flow circuit arrangement and transverse flow of gas over the tubes. The complete absence of baffles and zones of high gas velocity is one of the outstanding features.

7. In most high-capacity designs there is a minimum of boiler surface ahead of the superheater. For structural reasons some of the rear water wall tubes are located at the front and some at the rear of the front superheater section. Boiler surface beyond the superheater is also sometimes a matter of structural convenience in providing water-cooled supports for baffles, dampers and economizers. When bypass dampers are used for superheat control it is desirable to arrange the baffles so that most of the boiler surface is in the bypass. This improves the efficiency at high loads, lowers the temperature at the dampers, and results in more uniform temperature distribution entering the economizer. In Figs. 4 and 5 there is a single boiler bank of downtake tubes with most of the surface in the gas bypass. When extremely high superheat, or high superheat and reheat are involved, the designs become special and such units are characterized by a complete absence of boiler surface beyond the superheater as illustrated in Fig. 6.

8. The air preheater is generally selected before the economizer. This procedure is necessary because it is the function of the air preheater not only to cool the gas to the temperature required to meet the desired overall efficiency but also to preheat the air to the temperature required for efficient drying in the pulverizer. Therefore, the coal specifications have a lot to do with selection of air heater size in tending to fix minimum gas temperature (with consideration to condensation of acid in the heater) and required air temperature. The heat absorption by the air fixes the gas temperature drop in the heater and thus fixes the required gas temperature leaving the economizer. The heat absorption of the heater more or less fixes the length of the tubes, plates or sheets but the allowable draft loss and pressure drop fix the plan area.

9. The economizer is selected to absorb the heat necessary to cool the gas from the boiler outlet temperature to air heater inlet temperature. Generally, the superheater and air heater absorb such a large percentage of the total that the water does not closely approach the saturation temperature in the economizer. It is considered desirable not to approach saturation temperature closer than 35°F in the economizer and where the absorption is limited by these conditions additional boiler surface is used if the air heater absorption cannot be economically increased to make up the difference.

10. The number of pulverizers required for very large units is generally three or four. Often the specifications call for full output to be carried by the remaining pulverizers when one is out of service for repairs. This requirement results in oversize pulverizers or a large number. The size and total capacity must also be based on minimum grindability, minimum heat value and maximum moisture content, and if these requirements are partly conjectural or extreme emergency conditions it is sometimes questionable whether it is desirable to select pulverizers large enough to allow for the simultaneous occurrence of these conditions because oversize pulverizers will limit the minimum load on the unit.

New TAPPI Members

The Executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

William F. Underwood, Research Manager, Cellophane Research Section, E. I. duPont de Nemours & Co., Inc., Buffalo, New York, a 1925 graduate of Ohio State University, with a Ph.D. degree in 1930.

Donald E. Waid, Technical Supervisor, Ball Bros. Co., Noblesville, Indiana, a 1939 graduate of Purdue University.

Ruth M. Wendt, Chemist, Doubleday & Co., Inc., Garden City, L. I., New York, a 1941 graduate of the University of Colorado.

Arthur J. Schroeder, President, Arthur Schroeder Paper Co., Inc., New York 17, New York. Attended Pace Institute.

Philip Sjogren, Export Manager, Elof Hansson, Goteborg, Sweden, a 1920 graduate of the University of Goteborg.

Reyer Swan, Technical Sales, Watson Standard Co., Pittsburgh, Pennsylvania.

Paul E. Truttschel, Research Chemist, Appleton Coated Paper Co., Appleton, Wisconsin, a 1940 graduate of Marquette University.

John W. Wendell, Jr., Assistant Mill Chemist, Tileston & Hollingsworth Co., Hyde Park, Massachusetts, a 1940 graduate of Harvard University.

Christopher C. Wright, Board Mill Superintendent, Minas Basin Pulp & Power Co. Ltd., Hantsport, N. S., Canada.

Thaddeus R. Zegree, Senior Research Chemist, Crown-Zellerbach Corp., Camas, Washington, a 1937 graduate of Ecole Francaise de Papeterie, Grenoble, France.

Harold R. Rogers, Engineer, Union Corporation Ltd., Johannesburg, South Africa, a 1928 graduate of Krugersdorp College.

Stanley R. Sheeran, Technical Sales Representative, E. I. duPont deNemours & Co., Wilmington, Delaware, a 1941 graduate of the University of Notre Dame with a Ph.D. degree.

James E. Shepard, Sales Engineer, Brown Instrument Div., Minneapolis-Honeywell Regulator Co., Syracuse, New York, a 1931 graduate of the Rochester Institute of Technology.

Harold A. Sholl, Jr., Paper Industry Engineer, The Brown Instrument Div., Minneapolis-Honeywell Regulator Co., Philadelphia, Pennsylvania, a graduate of the Drexel Institute of Technology with an M. E. degree.

Richard B. Simpson, Branch Representative, Marathon Corporation, Menasha, Wisconsin. Attended the University of Chicago.

Modification of Soy Protein for Paper Coating Applications

By R. S. Burnett[1] and W. R. Eichenberger[1]

Abstract

The properties and behavior of a commercial soy protein are dependent both on the raw material and the method used for its preparation. Because of this, the possible variations in the properties of soy protein are almost infinite and soy protein must be tailor-made to fit the particular use for which it is intended. Viscosity-pH curves have been shown to be a means of characterizing and evaluating commercial soy proteins.

It has been shown that soy protein prepared for use by the paper coating industry, where adhesive strength and flow properties are important, is not an unmodified native soy protein but a product that has been greatly altered by subjecting it to a carefully controlled modification with alkali. This modification is believed to result in a partial unfolding of the globular shaped molecules to the fibrous shaps, accompanied by a probable decrease in molecular size.

The preparation of soy protein designed for paper coating applications involves a number of processing steps which must be carried out under carefully controlled conditions.

The raw material for the production of soy protein is solvent extracted soy flakes which contain about 50% of protein. The native, crude protein must not only be separated from the other components of the flakes but it must be subjected to a modification process which greatly alters the protein molecules. It is the purpose of this paper to outline briefly the steps involved in the manufacture of a soy protein suitable for use in paper coatings and to follow the changes which the protein undergoes during progressive modification by means of viscosity-pH curves.

Manufacture of Soy Protein

The first step in the manufacture of soy protein is the selection of high quality dehulled soybeans which are cracked and flaked for extraction of the oil by means of solvent. The oil extraction process and subsequent removal of solvent from the flakes are carried out without undesirable alteration of the protein present in the flakes.

To isolate the protein, one part of the substantially oil-free flakes is slurried with 10 to 20 parts of water and a small amount of alkali is added to increase the solubility of the protein. The solution containing the extracted protein is then usually separated from the flake residue by means of shaker screens.

If an "unmodified" soy protein is desired, this screened solution is subjected to filtration or centrifugation to remove flake fines, and the protein is precipitated from the solution, in the isoelectric range of the protein, by means of acid. The protein curds obtained are dewatered and dried.

However, such an "unmodified" protein is not suitable for use as a paper coating adhesive and the following additional steps are required. The screened liquor, containing the dissolved protein, is acidified without clarification and the protein curds obtained are allowed to settle. The supernatant liquor is removed, and the precipitated protein is re-dissolved and modified by treatment with alkali in order to bring out desirable characteristics. After digestion for several hours at a high pH, the solution, which now contains the alkali-modified protein, is filtered or centrifuged and the clarified liquor again acidified to precipitate the protein. These final protein curds are dewatered and then dried. The dried protein, after grinding to about 40 mesh, is ready for use.

A soy protein that is suitable for paper coating applications should give alkaline solutions having properties similar to alkaline solutions of casein. The progressive modification of soy protein with alkali to give a suitable product can be shown by means of viscosity-pH curves. The senior author and associates *(1)* at the Southern Regional Research Laboratory developed such a viscometric method of characterizing isolated vegetable proteins in connection with investigations on peanut protein utilization, and comparisons were made of peanut protein, soybean and cottonseed proteins and casein. The details of the method are given in this earlier publication and will only be discussed breifly in the present paper.

Viscosity-pH Curves

The viscosity-pH curves shown in Fig. 1 were obtained with protein solutions prepared over the alkine pH range by "cutting" or dissolving the protein in water with sodium hydroxide. The solutions were prepared at 25° C. and the viscosity measured at 25° C. in a Hoeppler rolling-ball viscosimeter. Since the viscosity of some of the protein solutions changes rapidly at certain pH values, the readings were made exactly 1 hour after the caustic soda was added to the solution.

If the protein which results from the first precipitation, prior to modification with alkali as outlined in the above method of preparation, is used to prepare solutions for viscosity measurements, there is obtained curve S, Fig. 1.

The solvent extracted meal used to prepare the soybean protein characterized by curve S was not subjected to heat during processing and the protein was extracted at a low pH value to keep modification of the molecules by alkali to a minimum. Hence, the protein is probably as near to an unaltered native protein as can readily be obtained. At pH values near 11.5 to 12.0 solutions containing more than 14% of this protein increase in viscosity at a rapid rate and soon gel. Because of the high viscosity and instability of solutions of this protein at the peak of the curve, it was necessary to use a 14% concentration of protein to obtain a complete curve. All other curves shown in Fig. 1 were made from solutions containing 18% protein.

It is of interest to compare the viscosity curve for solutions of a typical paper coating casein (C) with the curve discussed above for the "unmodified" soybean protein (S) and note the great difference in the flow prop-

[1] Central Soya Company, Inc., Decatur, Ind.

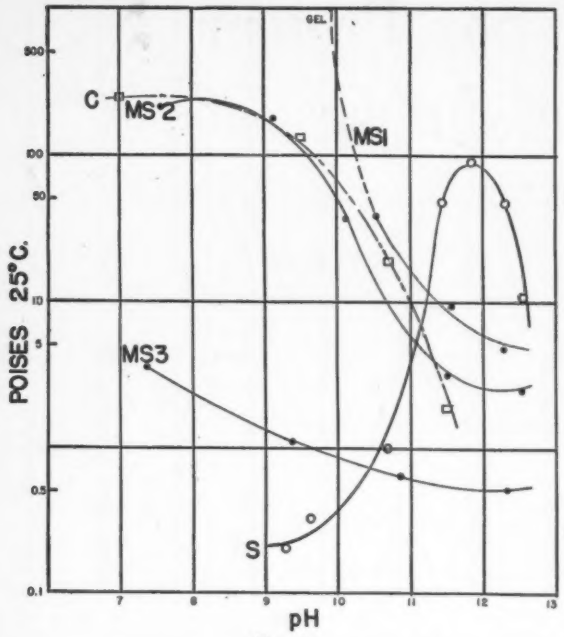

FIG. 1

Viscosity—pH curves for 14% solutions of "unmodified" soy protein (S) and for 18% solutions of modified soy proteins (MS1, MS2, MS3) compared with the curve for 18% solutions of a typical casein (C).

erties of solutions of the two proteins over the alkaline pH range. This soybean protein is also low in adhesive strength unless its solutions are prepared at the higher pH values where the viscosity is too high and unstable for most uses.

Curves MS1, MS2, and MS3 in Fig. 1 represent soybean proteins that have been progressively modified by contact with alkali prior to the second precipitation of the protein with acid in the process outlined above.

The protein represented by curve MS1 gives solutions which gel at pH 10.0 or lower when the concentration is 18%. The viscosity characteristics of the protein of curve MS1 indicates that further modification with alkali is required to produce the protein represented by Curve MS2 which is similar to the curve for casein. Further modification is shown by the protein of curve MS3 which is low in viscosity. Adhesive strength and viscosity are closely related but in order to obtain the most desirable adhesive properties a number of other factors must be considered which are not within the scope of this article.

It should be pointed out that the viscosities are plotted on a log scale and the differences in viscosity shown by the curves in Fig. 1 are large.

The various degrees of modification of soybean protein shown by the curves in Fig. 1 are brought about by varying the amount and kind of alkali used, the temperature and time of hydrolysis etc. As stated above, the history of the flakes used as a raw material must also be considered.

Mechanism of Alkali Modification

It is of interest to consider what is believed to be the mechanism of the alkali treatment which brings about the changes in the protein as shown by the viscosity curves in Fig. 1.

Senti et al. *(3)* have stated that "most proteins of current or potential industrial importance (such as soy protein) are in the molecular sense compact, almost globular structures as they occur in nature or as they are isolated by laboratory or commercial procedures. While the structure of none of the proteins is known in detail, it is a widely held view that, fundamentally, the molecules are chainlike but are normally in a coiled configuration by interaction among the numerous polar groups. Opportunity for interaction between molecules is thus minimal. If the molecules were uncoiled and fixed in linear form the number of intermolecular bonds would be far greater, and the mechanical properties of objects such as fibers, films, and plastics made from the altered proteins should be much improved".

The same phenomenon with regard to mechanical properties also applies in the use of soybean protein as a paper coating adhesive. Good film and fiber forming properties are merely manifestations of the high cohesive and adhesive strength required to hold the coating pigments together and on the paper.

Lauffer *(2)* has discussed the experimental facts pertaining to the relationship between viscosity, molecular size, and molecular shape. Viscometric methods are a means of following the over-all alterations in the size and shape of protein molecules when soybean protein is modified as a coating adhesive.

There are believed to be at least two changes taking place when soy protein is modified with alkali. One is the more or less uncoiling of the globular shaped molecules to the fibrous form. Another is the hydrolysis or splitting of the molecules to shorter chain lengths.

For example curve S, Fig. 1 represents a protein which is as near to an unaltered (uncoiled) native protein as can readily be obtained, and the high viscosity of its solutions at pH 11.5 to 12.0 indicates that the alkali is rapidly uncoiling the globular (less viscous) shaped molecules to the fibrous (more viscous) shaped molecules.

If the modification of soy protein with alkali is stopped at an early stage, a protein is obtained which has a sufficient amount of long uncoiled molecules to give the highly viscous solutions shown in curve MS1.

As the modification continues and the long molecules are reduced in size the satisfactory protein of curve MS2 is produced, and on further treatment, there is obtained the protein of curve MS3 which has been broken down to the point where the viscosity of its solutions is low.

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2. Lauffer, M. A., *Chem. Rev.*, 31, 561-586 (1942).
3. Senti, F. R., Copley, M. J., and Nutting, G. C., *J. Phys. Chem.* 49, 192-211 (1945).

Marketing by Manufacturers

Richard D. Irwin, Inc. has recently issued "Marketing by Manufacturers," edited by Charles F. Phillips of Bates College, assisted by Ralph S. Alexander, Columbia University, Robert T. Browne, Pillsbury Mills, Inc., Ralph R. Butler, McKinsey & Co., Harvey W. Huegy, University of Illinois, Harry R. Tosdal, Harvard University and others (637 pp. 6 x 9).

It was written to assist the manufacturer in reading policy decisions in the handling of marketing problems. Among the subjects covered are: The Distributive Machine and its Cost; Scope and Techniques of Market Research; Designing and Packaging the Product; and Government Control and Aid. In the appendix is a check list for introducing consumer goods.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y. at $6.00 per copy.